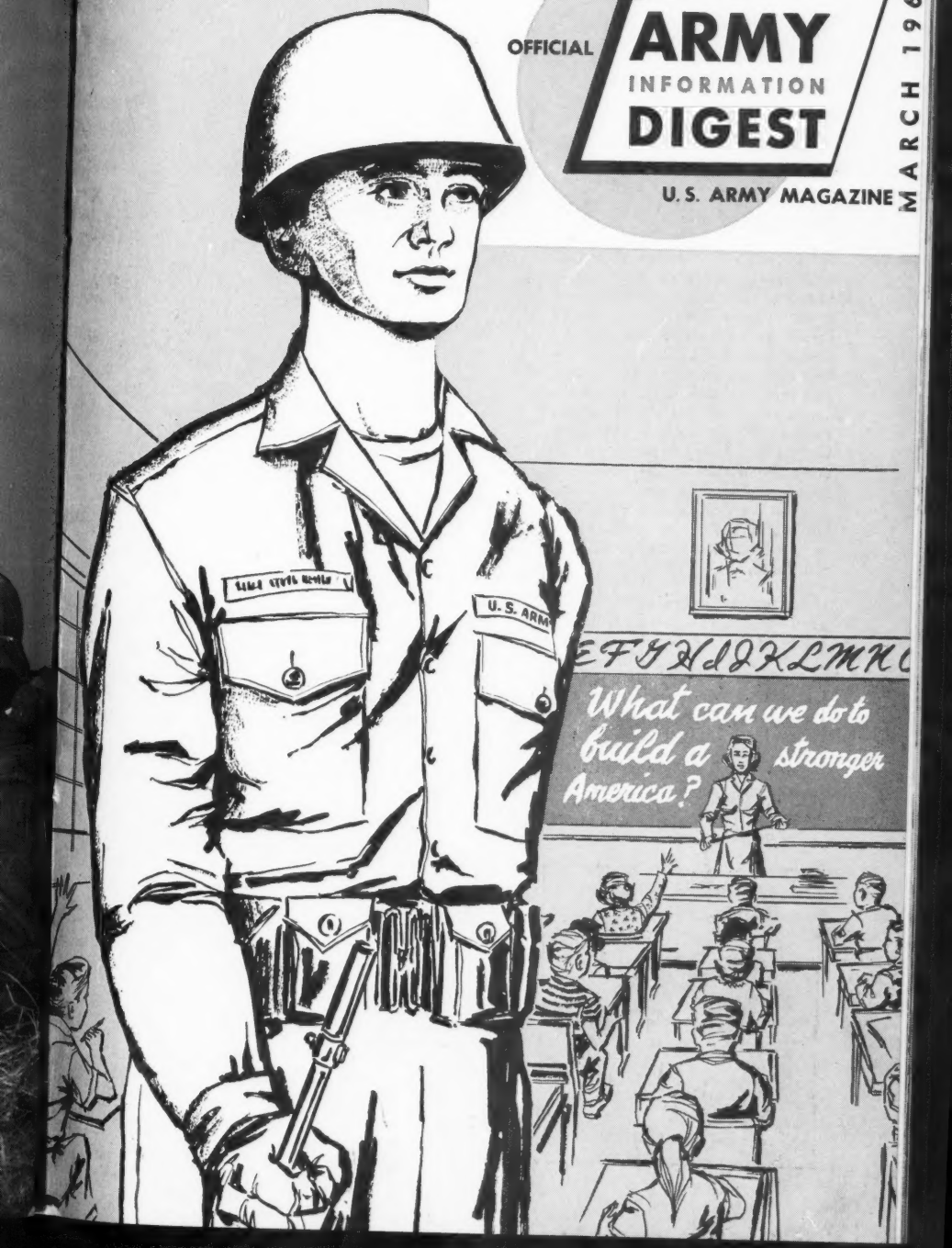
OFFICIAL

ARMY INFORMATION DIGEST

U.S. ARMY MAGAZINE

MARCH 1960



ARMY
INFORMATION
DIGEST

THE OFFICIAL MAGAZINE OF
THE DEPARTMENT OF THE ARMY

The mission of ARMY INFORMATION DIGEST is to keep personnel of the Army aware of trends and developments of professional concern. The Digest is published under supervision of the Army Chief of Information to provide timely and authoritative information on policies, plans, operations, and technical developments of the Department of the Army to the Active Army, Army National Guard, and Army Reserve. It also serves as a vehicle for timely expression of the views of the Secretary of the Army and the Chief of Staff and assists in the achievement of information objectives of the Army.

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COVER: Recognizing that Home, School and Church are Democracy's crucible in which are kindled the faith, patriotism and civic values that last a lifetime, the Secretary of the Army in this issue replies to a Sixth Grade Class, telling what can be done personally to build a stronger America.

COMMAND LIN

Army Views On Vital Issues

ON DEFENSE TEAM SUPPORT

"As General L. L. Lemnitzer, the able Chief
Staff of the U. S. Army, said recently, 'Each of t
aspects of our military effort contributes its indi
pensable share in our total capability to defeat a
gression. The achievement of effective combin
tion of the capabilities of the various Services
not left to chance. The blending of the energies
all of the Armed Forces so as to support each oth
fully is insured by our system of Unified Comman
for each of the major strategic areas where o
forces are maintained.'

"I have quoted General Lemnitzer because so
people have heard and read so much short-sight
haranguing by advocates of one Service or anot
that they, unfortunately, have come to regard
Pentagon as a latter-day Tower of Babel. Th
inadequately aware of the many key military
ures with true breadth of vision who are ded
to inter-Service teamwork and who strive to
tain the balanced forces needed to cope with
variety of aggression."

*Assistant Secretary of Defense Murray Snyd
at the Governor of Florida's Conferenc
Orlando, Florida, 11 December 195*

ON TRAINING FOR CITIZENSHIP

"Any educational program which makes a man
better soldier also makes him a better and mo
useful citizen. In addition to the many ski
learned through on-the-job training, the Arm
seeks to give the soldier an understanding
America's place in modern history and the indivi
ual's duty as a citizen. Above all, however, t
Army is determined to see that military service
not a period of 'lost time' insofar as education
opportunities are concerned. Many young m
whose formal education ceased long before th
entered the Army find themselves reawakened
enabled to achieve their full citizenship poten
through service programs of general educatio
well as technical training. This training for citi
ship is a very significant part of the Army's c
bution to the well-being of the Nation and the
cess of the great cause of peace and freedom."

*Secretary of the Army Wilber M. Bru
before the National Association of Manufact
New York, New York, 3 December*

FEATURES

BRIEFS

THE OFFICIAL ARMY INFORMATION DIGEST
U. S. ARMY MAGAZINE

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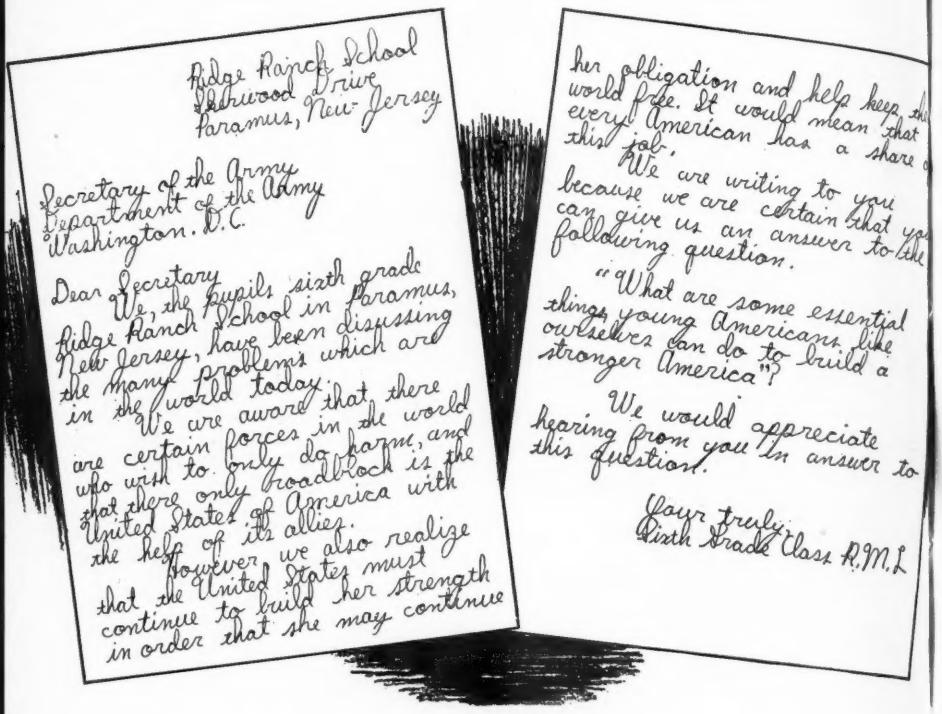
The Secretary REPLIES:



Ridge Ranch School
Fairwood Drive
Paramus, New Jersey

Secretary of the Army
Department of the Army
Washington, D.C.

Dear Secretary

We, the pupils sixth grade Ridge Ranch School in Paramus, New Jersey, have been discussing the many problems which are in the world today.

We are aware that there are certain forces in the world who wish to only do harm, and that there only roadblock is the United States of America with the help of its allies.

However we also realize that the United States must continue to build her strength in order that she may continue

her obligation and help keep the world free. It would mean that every American has a share in this job.

We are writing to you because we are certain that you can give us an answer to the following question.

"What are some essential things young Americans like ourselves can do to build a stronger America"?

We would appreciate hearing from you in answer to this question.

Your truly,
Sixth Grade Class R.M.L.

LETTERS such as the above frequently reach the Department of the Army. Many ask for detailed information on the Army's historic role in defense of our American heritage. Others reflect the idealism and enthusiasm of youth's quest for a meaningful role in our national life.

FAR from being regarded lightly, these letters receive the utmost serious consideration. They bespeak the spirit of service which must animate our entire society—citizens and soldiers, young people and adults—if our Nation is to survive with strength and purpose in the years ahead.

IN THE following letter, Secretary of the Army Wilber M. Brucker answers a fundamental question and sets forth the timeless moral and patriotic principles by which individuals and nations must live. The original letter and the Secretary's reply are published here as a document of Army-wide significance.—*Editor.*

SECRETARY OF THE ARMY
WASHINGTON

17 December 1959

Dear Boys and Girls:

I AM SURE that your teachers, ministers and parents are giving you some very good answers to your question: "What are some essential things young Americans like ourselves can do to build a stronger America?"

I realize, however, that these answers are in the form of lessons, or sermons, or your parents' rules for day-to-day living, and it is sometimes difficult to see just how they really apply to the whole big problem of making our country strong.

I am very much pleased that you thought of putting this question to me, because it is something very close to my heart. I believe that it is one of the most important questions which any young person—or any grownup as well—can ask. I am going to try to give you at least one answer of many that might be made.

I FEEL that you and all other young people in this great land can build a stronger America by doing two very basic things: First, make <u>yourselves</u> strong in mind, in body, and in moral character; and, second, help to make others strong, too.

In all the history of the world, the great nations were built by the many thousands of people who were strong in those ways. In every case, when the people became weak, their nation became weak, and sooner or later fell.

THERE is nothing more important to a nation than the moral strength of its people. I like to tell the

story of the Roman general, Marcus Atilius Regulus. He had been captured by the Carthaginians. They wanted him to return to his own land to urge the Roman senate to end the war on honorable terms for the Carthaginians, and they made him give his word that he would return to Carthage afterwards. When he got to Rome, he urged his fellow Romans to keep on fighting. Then, against the advice of his friends, he did return to Carthage as he had promised.

When the Carthaginians asked him why he had kept his word and returned to face execution for his stand against their wishes, he answered simply: "I am a Roman citizen." To him, that explained it all, and it showed the high moral character of the early Romans which helped to bring Rome to its position of power in the world of that time. Regulus would not abandon his principles to save his life.

Hundreds of years later Rome fell, but it was not the power of an enemy hammering at the gates that brought that great power down to defeat. Rome fell because the moral vigor of its citizens had decayed. They neglected their responsibilities. They neglected them not only on the field of battle, but in important areas of their everyday life.

OUR own nation was built by men and women who, like Regulus, were willing to suffer death for their ideas. They were people of many faiths who left the safety of their own homes to come to a new land where they could practice their religion and political beliefs freely. We became a great nation because, as individuals, our people had lofty moral convictions and built a great tradition of civic duty.

We can learn from them, and that is the reason why I feel that reading the history of our country should not be a chore, to be done merely as classwork. Rather, it should serve to guide and inspire us. I am always stirred by the final words in our Declaration of Independence: "And for the support of this Declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other our lives, our Fortunes, and our sacred Honor."

To those men, honor was their most sacred possession. Today it is saddening to see a lack of such high moral values in the lives of many Americans. We see this in young people who refuse to obey the law and run wild, and in grownups who think anything they do is all right as long as they can "get away with it."

Such people can well place the future of this great Nation in great danger.

WHAT you as individuals should do right now to help build a stronger America is to strengthen your own selves in every way possible. You should develop strong minds in strong bodies. You should develop your own abilities to the greatest extent, whether you expect in later years to become a farmer, factory worker, or technician, a professional man such as a lawyer, doctor, scientist, teacher or soldier, or a housewife and mother who guides her children.

You can do this by getting as much education and training as possible. You can study and understand and practice your own religious faith, and, above all, develop your moral character to the utmost. If you do all these things, you will grow up to be good citizens who can be trusted with the life and future of America.

ONE very important matter in connection with good citizenship is the defense of our Nation. As George Washington said: "It may be laid down, as a primary position, and the basis of our system that every citizen who enjoys the protection of a free Government, owes not only a proportion of his property but even of his personal services to the defense of it...." In other words, if you are going to enjoy the privileges of an American citizen—the blessings of freedom and all that goes with them—when you grow up you ought to be willing to bear arms to defend them if necessary. The American who claims to love his country, yet who does not want to have any part of the hardships and difficulties of defending it—who does not willingly pay the price of security in personal service—is certainly not helping to build a stronger America.

OF COURSE, for boys and girls in the sixth grade, the possibility of such service lies in the future. It is the hope of all of us that something can be done to end this cold war in which we now find ourselves. Actually we are engaged in a crusade for freedom against the forces of darkness that threaten the whole world. Is is not going to be easy to win this crusade. It is going to need a strong America to do it.

You can help make America strong by concentrating now on the things I have mentioned. Then when the time comes that you are called upon to serve your

country, whether in peace or in war, you will be better able to do what is necessary to keep America strong and free.

I BELIEVE that every problem we face today could be solved easily if we were really enthusiastic about our country, not just when the bands play and the flags wave, but every hour of every day, and in every part of our lives. Today there is need for a new spirit of pride in America which will cause all of us to roll up our sleeves and work for her to the very best of our ability all the time.

YOU WILL always play a very important part indeed in helping to build a stronger Nation if you have that pride and keep it bright throughout your lives, and show it in everything you do. Love of country is something we should never, never hide. We should let everyone know just how we feel about America. May each of you always feel that no boast you could possibly make could ever give you as much real satisfaction as to be able to say: "I am an American."

Sincerely your friend,

Wilber M. Brucker.

Wilber M. Brucker
Secretary of the Army

Sixth Grade Class
Ridge Ranch School
Sherwood Drive
Paramus, New Jersey

Serving servicemen, wherever stationed—

The Red Cross Covers Home Base

William R. Breyer

THE pen of Clare Briggs was halted by death 30 years ago, but the spirit of his well-loved cartoon, "When a Feller Needs a Friend," still lives.

Each month last year nearly 80,000 "fellers" in U. S. military service needed friends and found them in Red Cross offices.

Over 2,000 of these friends were working full time at military installations and hospitals; more were on the staffs of Red Cross Chapters, and besides these, tens of thousands of volunteers served in home towns and at stateside and oversea military reservations.

WILLIAM R. BREYER is on the staff of National Headquarters, American National Red Cross.

Aided by a Red Cross recreation worker in Fort Benning hospital, Sp 4 William Graul dictates a letter on recording tape to his family in Pennsylvania.

They listened to, and helped to solve, the problems of thousands of servicemen and their families. Some problems could be settled in short order by one or two telephone, telegraph, or mail messages and replies.

For instance, a serviceman returning with his family by Navy transport from Cuba was notified at sea that his mother was critically ill in Indiana. Also notified was the Red Cross port liaison officer at the Army Transportation Terminal in Brooklyn. By the time the ship landed, he had permission for the family to leave the ship immediately and air passage to Indiana. They arrived in time to see and be recognized by the mother before she died.

The plight of a private with an Army outfit in Panama was more serious. First, his wife at home, with new-born twin sons, ran short of cash when her allotment increase was delayed. The Red Cross tided her over with money.

Then the soldier's mother died and he came home on emergency leave. On his way back to Panama a Red Cross message intercepted him to say his sons were seriously ill. He came home again. When the babies were apparently recovering, he started back to the Canal Zone. But while he was en route, one baby died, the other had a relapse, and his wife became ill too. Home for the third time, he was warned the second son might not live.

After five weeks, the tide turned. The baby recovered. He and the mother were soon able to leave the hospital.

Through all this, the Red Cross

Assistant Field Director J. C. Jackson talks over personal problems with Pvt. Samuel Young at Fort Jackson as part of ARC services in field.

helped. It verified the facts the Army needed to grant leave and extensions, obtained plane reservations, and supplemented his Army pay and allotments with financial aid, totaling over $1,000.

The Red Cross also furnished the information on which the Army based its decision to transfer him to a post near home. Now the family is settled in an apartment near his new post.

RED CROSS workers assigned to help servicemen and their families are on call 24 hours a day the year around. Nearly 80,000 members of the Armed Forces were helped on military reservations each month last year; 87,000 men and their families were served each month by home-town Red Cross chapters.

Last year the Red Cross spent 39 per cent of its total budget, more than $33,400,000, on its programs of service to the Armed Forces, veterans, and their families. Most of this was spent on services to military personnel and dependents.

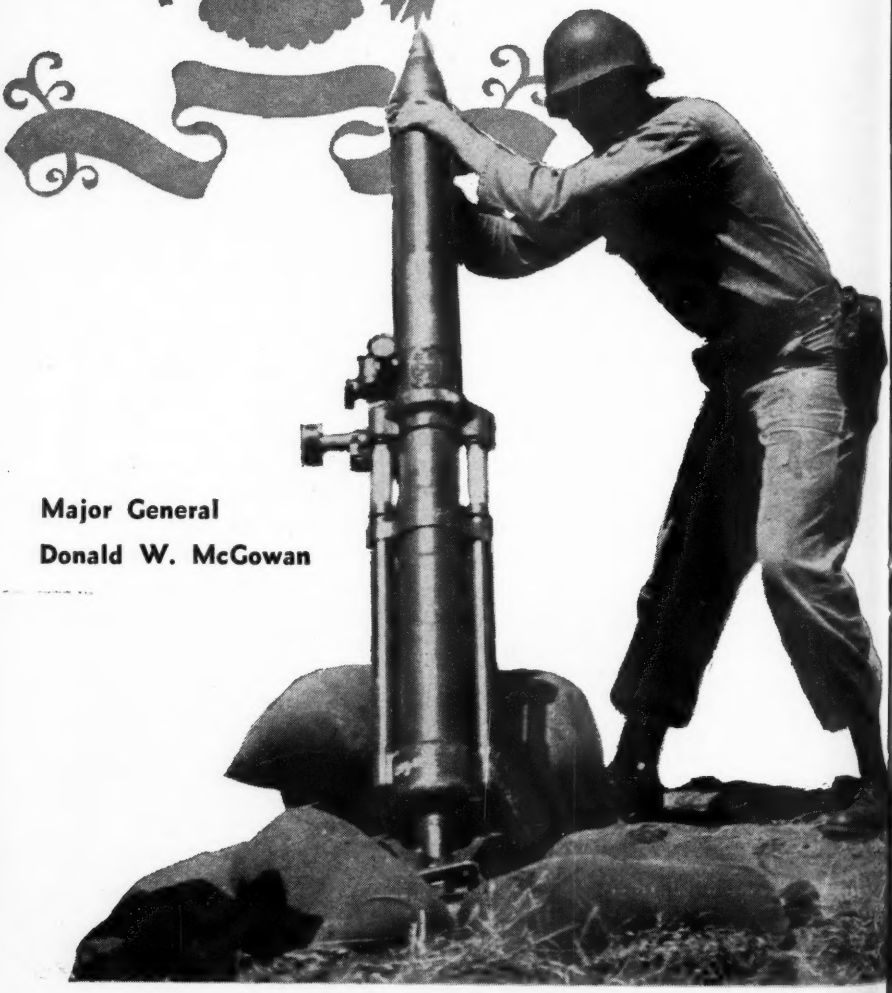
No matter where he may be stationed, at distant outpost or in the field, the serviceman finds that the Red Cross is constantly on the job, covering home base.

Patients Bainie Boyce and Francis Nadeau at Maxwell AFB Hospital get help at all-volunteer library from Staff Aide Diane Smith.

Sharing as well as supporti

the One Army missio

ARMY NATIONALGU



Major General
Donald W. McGowan

the role of the

GUARD TODAY

THE farmer, resting on his porch in the late afternoon sunlight, watched as a bright new car came down the road and stopped at his gate. An energetic young man hopped out and strode briskly up the walk.

He explained he represented a magazine devoted to new techniques of farming.

"Son, I'm not ready to try new ideas yet," the farmer replied. "I've been working this land for thirty years, but I'm still not doing everything I already know."

WHILE I don't completely subscribe to that farmer's point of view—for certainly the influx of new weapons and techniques into the Army is essential to our survival—I do think we should not allow our natural interest in new developments to diminish our efforts to make better use of what we already have.

In fact, the One Army concept—in which the reserve components now *share,* rather than back up, missions of the active Army—demands of all components a full understanding and use of one another's capabilities to fulfill the Army's missions.

The Army National Guard has been part of the American scene for more than 300 years. It is the only non-regular military force provided for in the Constitution. Perhaps because it is so well known and so firmly rooted in our history, Americans tend to take it for granted without really knowing much about it. Even among Army personnel, I have found—except for those who have entered the active Army from ranks of the Guard, and those who have served with the Guard as advisors—there has been comparatively little opportunity to learn much about the Army National Guard.

THE close, interdependent relationship existing between active Army and reserve components has been underscored in this statement by General Maxwell D. Taylor, former Army Chief of Staff:

"The Army National Guard, the Army Reserve, and the active Army make up a single integrated Army with a single task to perform. All elements must fall into place on M-Day to form a balanced structure of combat-ready units and individuals. Many of the units required will be provided by the Army National Guard. Their missions are recorded in approved war plans just as specifically as are those of active Army units. The only significant difference between the two types of units is the time when they must be ready to deploy to combat . . .

At summer encampments throughout the country, Guardsmen work out on rifle ranges to keep up marksmanship skills.

"With an active Army of only 14 divisions by the end of Fiscal Year 1960, the importance of the backup of 27 National Guard divisions is readily apparent."

For this reason, if for no other, members of the active Army should seek to learn more about the officers and men who are ready to fight at their side.

Dual Federal-State Status

THE Constitution, in the section devoted to "Powers of the Congress," states that Congress shall have the power

> ". . . to provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions; to provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively the appointment of officers, and the authority of training the militia according to the discipline prescribed by Congress."

This basic directive, which establishes the unique dual Federal-State status of the National Guard, has been implemented and expanded through the years.

The term "National Guard" was first associated with the militia when New York's 7th Regiment, selected to serve as the guard of honor for General Lafayette on his triumphal return to America in 1824, was rechristened in the name of France's *"Garde Nationale,"* which Lafayette then commanded. During the 19th Century the title gradually gained favor.

MAJOR GENERAL DONALD W. McGOWAN

Chief, National Guard Bureau

Department of the Army

The National Guard began to assume its modern pattern with passage of the Dick Act in 1903, further strengthened by the National Defense Act of 1916 which put the issuance of arms and equipment, and part of the responsibility for pay and benefits, in the hands of the Federal government. An amendment to the 1916 act passed in 1933 established the National Guard of the United States as a reserve component of the Army. These and subsequent laws affecting the National Guard have been further codified and augmented in Titles 10 and 32 of the U. S. Code, signed into law in August 1956.

THROUGHOUT its history the National Guard—made up entirely of volunteers—has been equal to the responsibilities imposed on it. Guardsmen have fought with courage and distinction in every war from early Indian skirmishes to Korea. In World War I, two of the first three Army divisions to enter combat in France were National Guard divisions. In World War II, the National Guard contributed 18 combat divisions to U. S. ground forces, including the first to be sent to Europe and the first to engage in offensive operations in the Pacific. In the Korean War, two Guard divisions saw action in Korea, with two others assigned to Europe to bolster NATO forces.

World conditions and the state of military technology today require of the Guard a high degree of readiness. Secretary of the Army Brucker has compared this readiness to that of our pre-Revolutionary Minutemen who carried their weapons when they tilled the soil and even when they went to church.

High priority divisions get new equipment like this 106mm recoilless rifle as it becomes available through supply channels.

Combat engineers stage assault river crossing, above, while Guardsmen below qualify on M-56 assault gun during summer training.

But today Guardsmen must possess also an enormously increased technical knowledge of the weapons and techniques of war.

With full support of the active Army, the Army National Guard is swiftly adapting itself to meet these new demands as effectively as it met those of bygone days.

State Missions

AS THE Congress foresaw, states and communities also often have need for trained and disciplined military forces. The National Guard in each state is under command of the Governor, available immediately in event of disaster or local emergency. This responsiveness to state as well as nation in time of need is the essence of National Guard service.

State missions assume a wide variety of forms. In recent months, Guardsmen were called out when a Carolina coastal hurricane caused widespread destruction. They rescued the stranded and injured, stood watch against looting, helped clear debris, and provided food, shelter, clothing to the homeless.

When Nikita Khrushchev visited an Iowa farm in October, a thousand Iowa National Guardsmen manned an elaborate security network along the route.

In Georgia last May, Army Guardsmen joined forces with the state highway patrol, not to catch speeders but to stress highway courtesy and safety on Memorial Day.

Last spring the Governor of Montana called on National Guardsmen to put down a prison riot in which the warden and several guards were being held hostage. The Guardsmen carried out a "blitz" maneuver, broke up the riot and rescued the hostages, unhurt.

Almost every day Guardsmen somewhere are responding to calls for assistance. They have fought forest fires, dug through landslides

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THE NATIONAL GUARD—Heroic and Historic Member of the One Army Team

By General Bruce C. Clarke

"THE ARMY NATIONAL GUARD made an outstanding contribution to victory in the First World War, but it was in World War II that the Guard really proved its importance as one of the shaping forces in our national policy.

"When induction of Guard units was begun in the fall of 1940, the Active Army numbered a scant quarter-million officers and men. Of this total, nearly 200,000 represented short-term enlistments.

"The Guard brought into service more than 300,000 men, organized into 18 combat divisions, plus numerous non-divisional combat and support units. Entry of these troops more than doubled the strength of the Army in being and gave the country's ground combat forces a solid base for the tremendous expansion which was to follow.

"Nine of the eighteen divisions crossed the Atlantic to Africa and Europe, and the other nine went to the far reaches of the Pacific. Guard units participated in 34 separate campaigns and seven assault landings.

"Eighty-eight units were awarded Presidential and Distinguished Unit Citations for outstanding performance of duty in action, conspicuous valor or heroism.

"Individual soldiers won 14 Congressional Medals of Honor, 50 Distinguished Service Crosses, and more than 500 Silver Stars."

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and snowdrifts, searched for fugitives and lost children, snatched victims from floodwaters and rapids by helicopter and DUKW, dropped food to stranded cattle, and restored order in communities torn by labor disputes.

Recovery: A Vital Mission

THE Army National Guard, together with the other reserve components, could well be our Nation's most important domestic asset in event of a nuclear attack. Dispersed as it is throughout the 50 states, Puerto Rico, and the District of Columbia, it would be virtually impossible to destroy all or even a major part of its strength.

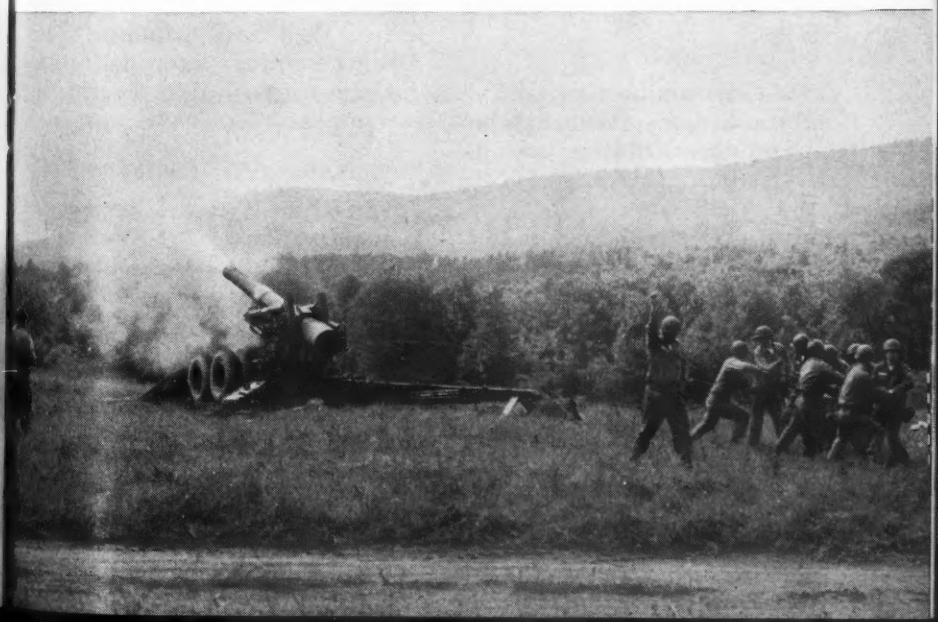
National Guard equipment, facilities, communications nets, and disciplined, trained personnel would be invaluable in expediting military and civilian recovery from the immediate effects of a nuclear attack. No other immediately available and ready force is as well trained, organized, and equipped to do this job. With all available active forces deploying for immediate military operations, the Army National Guard would be on hand to help devastated areas until civilian authority could take over.

Chain of Command

THE National Guard Bureau is a joint agency of the Departments of the Army and the Air Force, responsible to those departments for formulating, and coordinating with the states, plans and programs for the Army National Guard and the Air National Guard. As Chief of the National Guard Bureau, I am responsible to the Chief of Staff of the Air Force for Air National Guard programs and the Chief of Staff of the Army for Army National Guard programs. My comments here, however, are devoted principally and primarily to the Army National Guard (ARNG).

Because the Army National

Guard crew of a Rocket Howitzer Battalion on active duty for training pulls the 50-foot lanyard on an 8-inch howitzer to fire traditional first round.



Typical of the modern equipment now in hands of various Guard Divisions are the 8-inch self-propelled howitzers here being prepared for firing during summer training.

Guard is normally under state control in time of peace, our chain of command differs from that of the active Army in relation to the Army Reserve. The National Guard Bureau is, by law, the sole channel of communication between the Department of the Army and the Army National Guard of the various states. This legal distinction does not, however, interfere with active Army supervision over operations and training.

THE Commanding General, U.S. Continental Army Command prepares training directives for the Army National Guard, as for the Reserve, and supervises Guard training, normally through zone of interior Army Commanders. Active Army officers and enlisted men are assigned to each Army National Guard unit to advise the Guard commander in conducting training in accordance with Army standards.

The active Army is also represented in each state by a United States Property and Fiscal Officer who exercises control over Federal funds, property and equipment made available to the state for training the National Guard in its Federal missions.

IN these ways, the language of the Constitution is carried out. The Federal government exercises its responsibility for "organizing, equipping, and disciplining" the National Guard, while the states recruit their own personnel and conduct training "according to the discipline prescribed by the Federal government."

Pentomic Reorganization

TO MATCH the active Army's Pentomic structure, the National Guard Bureau in January 1959 initiated a complete reorganization of the Army National Guard. At that time there were 5300 Army National Guard units based in 2600 communities throughout the country. The Pentomic structure called for fewer units in an organization with increased unit personnel strength.

The changeover posed innumerable problems within the states, which were required to consolidate units in some communities, expand them in others, change branch assignments, and at the same time assure full use of existing armories and other training facilities.

Recognizing these myriad problems, the Department of the Army set 31 December 1960 as the date for completion of the reorganization. The states, however, plunged into the task with such energy and resourcefulness that the reorganization was entirely completed by 21 October 1959—more than a year ahead of schedule. Today the Army National Guard is made up of 4500 units, with a total strength of 400,000 officers and men.

Mobilization Readiness

THESE Army National Guard units combine to form 21 infantry divisions, six armored divisions, 11 separate infantry battle groups, eight armored cavalry regiments, 183 combat type battalions (including Nike units), and 81 combat and support organizations.

Our Nike on-site air defense battalions, which must be ready for instantaneous action in event of air attack, are organized at full strength. However, the strength of ARNG infantry and armored divisions ranges from 71 percent for six top priority divisions down to 55 percent for others. Comparable ratios apply also to the organic equipment on hand.

These manning and equipping percentages have been carefully worked out with the active Army. Personnel and equipment that would be necessary to bring all the divisions and separate units to full wartime strength are earmarked and would become available as soon as units are mobilized. All key positions, including officer spaces, are fully manned. Within 120 to 150 days, top priority ARNG divisions would be at full strength, trained and ready for deployment into combat. Soon thereafter others would follow by increments.

Half a Million Weapons

THE ARNG equipment picture has materially improved in the past few years. We have 64,000 wheeled vehicles, and some 3200 tracked vehicles, including 2400 tanks. We have half a million weapons of all

On the firing line during annual active duty for training period, these Guardsmen of an armored unit work out with weapons in a tactical exercise.

The Army National Guard has assumed a full-time air defense mission, taking over the manning and operation of many Nike-Ajax units at various sites throughout the country.

types, including 36,000 crew-served weapons. Our aviation units are equipped with 850 aircraft, both fixed-wing and helicopters.

ARNG high priority divisions are first to receive new equipment as it comes into supply channels, as well as critical items in short supply, to enable them to meet early mobilization and deployment commitments. However, all units of the Army National Guard are statutorily part of the first line of defense, regardless of mobilization priority, and all are equipped to meet their current training needs.

Problems are being encountered, of course, in filling all our requirements, particularly for latest developed ordnance and signal equipment, but these are largely a reflection of the active Army's own difficulties in acquiring modern weapons in sufficient quantity. Meanwhile, the ARNG has learned to make maximum use of items in short supply by setting up equipment pools and rotating material among various units during annual field training periods.

By such expedients we are getting the most out of the resources available. As a result, we are confident that we can attain and maintain the degree of training necessary to carry out assigned missions.

Training: Four Hours Plus

TO BRING ARNG units to a higher degree of mobilization readiness, the use of multiple and weekend drills is a *must*. Sole use of the old two-hour evening drill is definitely a thing of the past.

I am often asked—how can Army National Guardsmen possibly be well trained on an average training period of four hours a week? Of course we would like more training than can be accomplished in four hours, but even so our unit commanders find they can get a lot done in that time by careful preplanning. Actually National Guard personnel devote much more time to training. Here are some other factors that contribute to their operational readiness:

• Most Army National Guard officers and many key noncommissioned officers are veterans of active military service. These men know

the importance of adequate training and what to stress in training programs.

• Some Guardsmen are on full-time duty. In every Guard organization, some members work full-time in essential operational, maintenance, and administrative tasks to keep their units in top shape.

• All Guardsmen are authorized to take part in 15-day field training each year, where all elements of the division join in combat exercises to test the results of their unit training efforts.

• Guardsmen make full use of Army Service School training quotas. Eight thousand Guardsmen will attend resident staff, branch, and technical schools this year, and 40,000 are enrolled in Army extension courses directly related to their military specialty.

• Many Guardsmen work at civilian jobs comparable to their military assignments. We of the National Guard like this because the man is exercising his skills full time. His employer likes it because ARNG training programs stimulate ideas and procedures which make the Guardsman a more valuable employee.

• Officers and noncommissioned officers who conduct training spend hours of their spare time preparing for these assignments. Responsibility for training is rotated to give all key men valuable experience.

• Rifle matches, command post exercises, demonstrations, parades, open house, inspections, and other special events during the year encourage individuals to improve performance and build unit esprit.

• Off-duty education programs, hobbies and sports activities contribute much to the Guardsman's training and professional ability.

Nike Missions

THE Army National Guard has assumed a full-time air defense mission. Elements of 34 Nike battalions will take over from the active Army the manning and operation of 19 Nike-Ajax on-site battalions ringing major population centers throughout the country, plus two Nike-Hercules on-site battalions in Hawaii.

ARNG is now operating 36 batteries in seven major communities, and Guardsmen are training at Fort Bliss, Texas, to take over additional sites in coming months.

This function is a significant departure from the traditional concept of the Army National Guard as a mobilization force, and it provides a prime contribution to the "One Army" concept. Now, for the first time, National Guardsmen are joined with the active Army in peacetime to carry out an essential portion of the Army's responsibilities. Active Army personnel who have been manning these sites are freed for other urgent missions.

Personnel Proficiency

SINCE October 1957, every Army National Guard recruit without prior military service has been required, as a condition of his voluntary enlistment, to take six months active duty basic and technical training at Army Training Centers. This program, more than any other single factor, has made possible enormous advances in Army National Guard mobilization readiness. It frees National Guard units of the never-ending task of providing individual training for new recruits. Instead it delivers back to

During civil emergencies, Guard units stand ready to respond to calls for help. Here an armored personnel carrier goes to rescue of a marooned family near Buffalo, New York.

the units their new men provided with a standardized military training background. Accordingly, each Army National Guard unit commander is now able to concentrate upon training the unit for its combat mission.

Simultaneously much higher standards have been set on officer qualifications. As recently as two years ago, the Army National Guard commissioned as second lieutenants more than 3000 individuals, of whom barely one-fourth had qualified through formal Officer Candidate training. Some 1300, for example, were commissioned upon completing the 10-series Service School extension courses; more than 500 were directly commissioned by reason of active service as warrant officer or as a first three grader; and 350 because of being college graduates, even though without ROTC training. Virtually all of those individuals have since developed into capable officers.

Today, however, Army National Guard mobilization missions no longer allow time to train officers after they have been commissioned. Accordingly, the ARNG has eliminated as a qualification for commission the 10-series extension courses and the college diploma. Of 2100 officers commissioned in the Army National Guard last year, two-thirds were graduates of Officer Candidate Schools, operated either by the Army or by the states under Active Army accreditation. Another 500 were graduates of advanced ROTC, 128 were officers who joined upon release from active duty, and less than 100 were commissioned from among outstanding first three graders and other sources.

To qualify for promotion, an Army National Guard officer must now have completed a resident or correspondence course of instruction offered by an Army Service School commensurate with his branch and grade, or have demonstrated equivalent experience on active duty.

Army Advisors

IN THE Active Army, the men who are most enthusiastic about Army National Guard organization and capabilities are those who have

When tornadoes strike and storms cause havoc, men and equipment of the ARNG are called on to render assistance.

served a tour with the Army National Guard—either in the National Guard Bureau in the Pentagon, as advisors with units throughout the country or upon training inspection boards during annual field training.

Currently about a thousand officers and 1600 enlisted men are on duty as advisors with National Guard units. As the title indicates, their job is to act as advisors to the responsible National Guard commander on all aspects of operations, training, and administration, to assist him in conducting these functions in accordance with Active Army standards.

High caliber Active Army personnel are selected for advisor duty, based upon military schooling, experience, and personal attributes. Each individual being considered for assignment is carefully screened by the Active Army and the National Guard Bureau to insure that he meets the high standards.

The Army National Guard has been fortunate in having active Army officers and noncommissioned officers who have not only performed their assigned duties in an exemplary manner, but who have entered wholeheartedly into the varied activities of National Guardsmen, individually and as a unit, in the life of their community.

In the spirit of "One Army," we invite all members of the active Army who may be stationed in or near communities with an Army National Guard unit to make themselves known to its officers and men who are proud to wear the same uniform.

Secretary of the Army Brucker recently summed up this mutual role exceedingly well in this statement: "When an American soldier's blood is shed in battle, no one asks his branch or component. If we bleed together in war, we must sweat together in this period of danger to create a 'One Army' of no-label soldiers, dedicated only to their duties in the preservation of freedom."

This Guard truck rescued workers in Washington lumber mill when log pile shifted and blocked their escape route in recent flood.

Complex new skills and techniques are woven into the pattern of a typical day in the life of a

SINCE the beginning of the art of soldiering, noncommissioned officers have started their day in the same traditional way. The sounding of reveille has been followed by virtually the same chores of getting up—washing up—dressing up—policing up — and filling up with breakfast. This procedure is the same today as it was two, three or five decades ago.

In today's modern Army, however, the sound of the work call whistle marks the end of traditional routine and the beginning of the modern concept.

THE soldier's day in peacetime has always been spent in training. This has not changed. The soldier still spends his day preparing for that moment when all the years of preparation and experience will be called forth in defense of his country.

The great difference lies in what the soldier has to train with, and the complexity of skills required in its management and use. In the not-too-long past of the horse-soldier, for instance, the day was spent in taking care of his weapons, grooming his mount and training in their use.

Today, the soldier still spends his day in training with weapons and mounts. However, his weapon could well be a complicated, one-ton missile capable of delivering kilotons of destruction, and requiring advanced technical skills to keep it at the peak of readiness. Reflecting this changeover, the traditional image of the bull-voiced drill sergeant has given way to that of the

SERGEANT DAVID G. SMITH is assigned to Public Information Office, Fort Monroe, Virginia.

MODERN ARMY NCO

Sergeant David G. Smith

Sgt. Sevachko is a mechanical maintenance supervisor who directs his men in completing the final phase of preparing a missile for launching.

educated NCO who is both a highly trained technician and an accomplished leader of men.

The difference is perhaps best illustrated by following through a typical day in the life of a modern Army NCO.

AS THE last strains of reveille faded away over the Lower Virginia Peninsula, Sergeant Edward F. Sevachko, "B" Battery, 4th Missile Battalion, 51st Artillery, kicked back his blankets and reached for his combat boots.

Boots on, he grabbed his towel and headed for the wash room.

Quickly washing and shaving, Sevachko returned to his area to complete the traditional morning routine of dressing up, policing up, and filling up with breakfast.

Just as Sevachko finished his second cup of coffee, the whistle blew for work call. Rounding up his two assistants for the day, he headed for the missile assembly building.

SERGEANT Sevachko is a missileman. His particular site is part of the intricate network of missile bases surrounding the vital industrial and military areas in the United States. The men who man these sites must be ready twenty-four hours a day, seven days a week. Every minute of the day there are men manning the switchboards, the telephones and the radars. Others, awake or sleeping, are constantly ready to head for the underground launcher which transforms the Nike from a sleek white needle to a screaming, searching weapon of enormous destructive power.

The sergeant is a mechanical maintenance supervisor—a job that requires a knowledge of essentials of mathematics, physics, electronics, and materiel. Sevachko obtained this knowledge while attending the Nike-Ajax Guided Missile Maintenance Course at the Army Air Defense School at Fort Bliss, Texas.

He first entered the Army as an

enlisted reservist in 1956. After finding that he was qualified for the missile maintenance course, he reenlisted in the Regular Army to become a missileman.

On this day, the sergeant and his men were to complete the final mechanical phase of preparing a missile for launching. Just yesterday, a new missile had been removed from its container and Sevachko had performed the initial checkout—a job which involved a complete inspection of the missile and the step-by-step performance of over 50 separate checks.

Now the missile was brought outside. Air hoses were attached, and the hour long process of pressurizing the missile begun.

Next, the sergeant and his men went into the launcher pit where they brought to the surface the live booster which was to be attached to the missile.

The missile was taken to the loading area by means of a dolly. Utilizing a small crane called a "cherry picker," Sevachko brought the live booster rocket into the loading area and supervised the "marrying" of rocket to missile.

Now began the most difficult and dangerous part of the operation—that of oxidizing and fueling the missile. After bringing the red, fuming nitric acid from its storage place, Sevachko and the crew donned heavy rubber suits which would protect them from the acid.

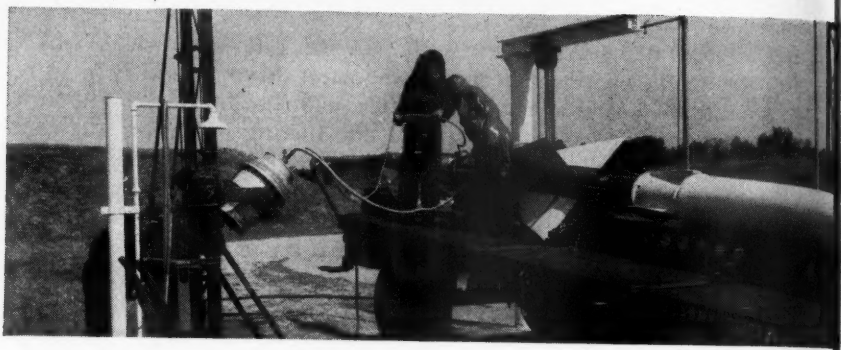
The extreme heat of the day made it necessary for the men to cover the rubber suits with an outer garment of terry cloth which, when wet down, would help to reduce temperature inside the suit.

The fueling operation was completed around noon. After washing the suits to remove any possible trace of acid, the entire loading area was hosed down.

It was now lunch-time. The crew headed for the billets to wash up and enjoy a brief respite from the scorching heat before going to the mess hall.

Using a small crane called a "cherry picker," the live booster rocket is brought to the loading area and "married" to the missile which then is oxidized and fueled.

During fueling operation, men wear heavy rubber suits to protect against red fuming nitric acid.



The sergeant and crew fueling the Nike missile may use the handy outside shower to cool off.

RETURNING to the loading area after lunch, Sevachko supervised the delicate process of "warheading" the missile—that is, arming the missile to fire. This is not a dangerous operation but it does require a high degree of skill and knowledge of the missile.

With the "war-heading" accomplished, the missile was removed from the loading area and taken to the launching pit. Here it was transferred from the dolly to the launcher rack and lowered into the pit. Sevachko then began the real work of the day.

After the missile has been "war-headed" and fueled, it is returned to the deep concrete launching pit where Sgt. Sevachko performs final preparation check.

DOWN in the launcher pit, he performed the final preparation check, consisting of a complete inspection of components and every electrical connection of both missile and launcher. Savachko spent the rest of the day in the pit completing the operation.

There remained one final phase of the day's work—that of assuring himself that the missile would come up out of the pit and go into a firing position. Through the intercom, Sevachko directed the raising of the slim, white "needle" into firing position. He was now satisfied that all was in operating order.

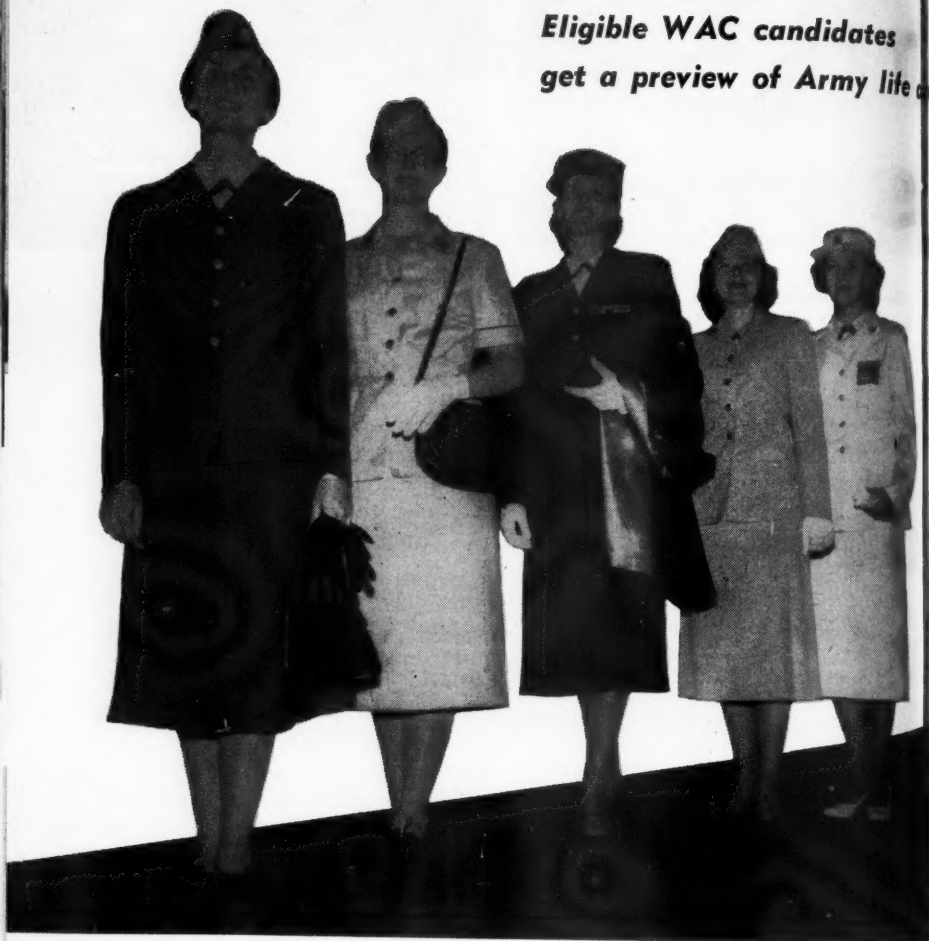
Sevachko headed back toward the assembly building to see that the crew had cleaned and stored all of the equipment used during the day.

As he approached the building, Sevachko turned and gazed at the still raised missile—the result of his day's work. The "needle" seemed to dominate the horizon as the sun's rays glanced from the smooth white hull.

Now, for Sevachko and his men, the day resumed a long-familiar pattern—a nourishing hot supper followed by reading, letter writing, TV viewing and games in the unit day room, and so to bed.

THUS ends a day in the life of a modern Army NCO—technician and leader—a soldier who by the nature of his duties must possess an intricate knowledge of his technical job and at the same time be proficient in the art of leading men.

At end of day's work, one last test remains to be performed—the missile now is brought to its firing position.



Eligible WAC candidates get a preview of Army life

Lieutenant Colonel Mary C. Fullbright

TRADITIONALLY, Missouri has been known as the "Show Me" state. Today, however, the Army has discovered that modern American college girls, from every state in the Union, also have this same attitude.

—Show me what you do.
—Show me how you live.
—Show me where I can use my talents and abilities in the defense of my country.

A Women's Army Corps program —called the College Junior Orientation Course—now does just that. It shows young women, in advance, what life will be like when they

LIEUTENANT COLONEL MARY C. FULLBRIGHT, WAC-USAR, is a Mobilization Designee to the Office of the Director, United States Women's Army Corps.

The Army Shows Them

select the Army as a career. It enables college women, interested in becoming officers in the Women's Army Corps, to familiarize themselves with the Army. The course, in short, is designed to "show them."

The plan serves a double-barreled purpose. It enables the potential officer to learn at first hand how her training and capabilities can be utilized in a great variety of military assignments. It also gives the Army an opportunity to observe and to evaluate potential new officers prior to tendering them commissions.

The pilot program was introduced in 1957. Nineteen co-eds, representing 19 different colleges throughout the United States, reported to the U. S. Women's Army Corps Center at Fort McClellan, Alabama, for their first taste of Army life. All were enlisted as corporals in the U. S. Army Reserve and processed in the regular military manner.

Physical check-ups, uniform issues, and instructions regarding barracks inspections were followed by classes in Leadership, Military Customs, Courtesies and Traditions, the Army in National Defense, Map Reading, Military Justice, Rockets and Missiles and Special Staff Functions.

Physical conditioning, inspections and parades also were integral parts of the program. A field trip to Fort Benning for introduction to the combat arms, a jeep tour of the Chemical Center, as well as familiarization rides in Army helicopters and light aircraft were included in

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DISTINGUISHED graduates of the Army Officer Candidate Course or WAC Officer Basic Course may be commissioned as officers in the Regular Army, as set forth in Section III of Army Regulations 601-100. Individuals recommended by commanders of major commands must meet general eligibility requirements, and further must have completed at least 18 months of Federal service within 2½ years immediately prior to application; they must possess an exemplary record of efficiency and personal conduct; have distinguished themselves by demonstrated outstanding qualities of leadership and aptitude for military service, and possess personal attributes considered requisite to a successful career as a commissioned officer of the Regular Army. Application procedures are detailed in AR 601-100, dated 15 June 1959.

College juniors receiving first taste of military life meet with Col. Mary Louise Milligan, Director of Women's Army Corps, at U. S. WAC Center, Fort McClellan, Alabama.

the month-long orientation course.

The young women also were introduced to the social side of Army life, in off-duty time dances, picnics, teas, swimming parties, shows, and luncheons.

SUCCESS and popularity of the program has been demonstrated by its phenomenal growth. The second summer course held in 1958 enrolled 34 cadets from 28 different colleges and universities. An expanded program was presented, and the enthusiastic response resulted in an even larger enrollment the next year.

The third course in August 1959 included 61 young women representing 28 states and 42 colleges and universities, and ranging in age from 18 to 24. Their college majors and minors included history, English, education, home economics, science, sociology, psychology, music, art, drama and foreign languages. The cadets' extra-curricular interests were typical of normal American girls, running the gamut from sports and travel to rock 'n

Lieut. Sally Forth is name of training aid being viewed by Cadet Sheila R. Bowman during instructional hour on role of WAC today.

roll and rock hunting. Many had demonstrated outstanding leadership qualities on campus.

When asked to list their reasons for applying for training, members of the third class used the word "curiosity" most frequently. They wanted to be shown varied aspects of Army service and life. They also agreed that by the end of the four-week course they had been shown these aspects—vividly, interestingly.

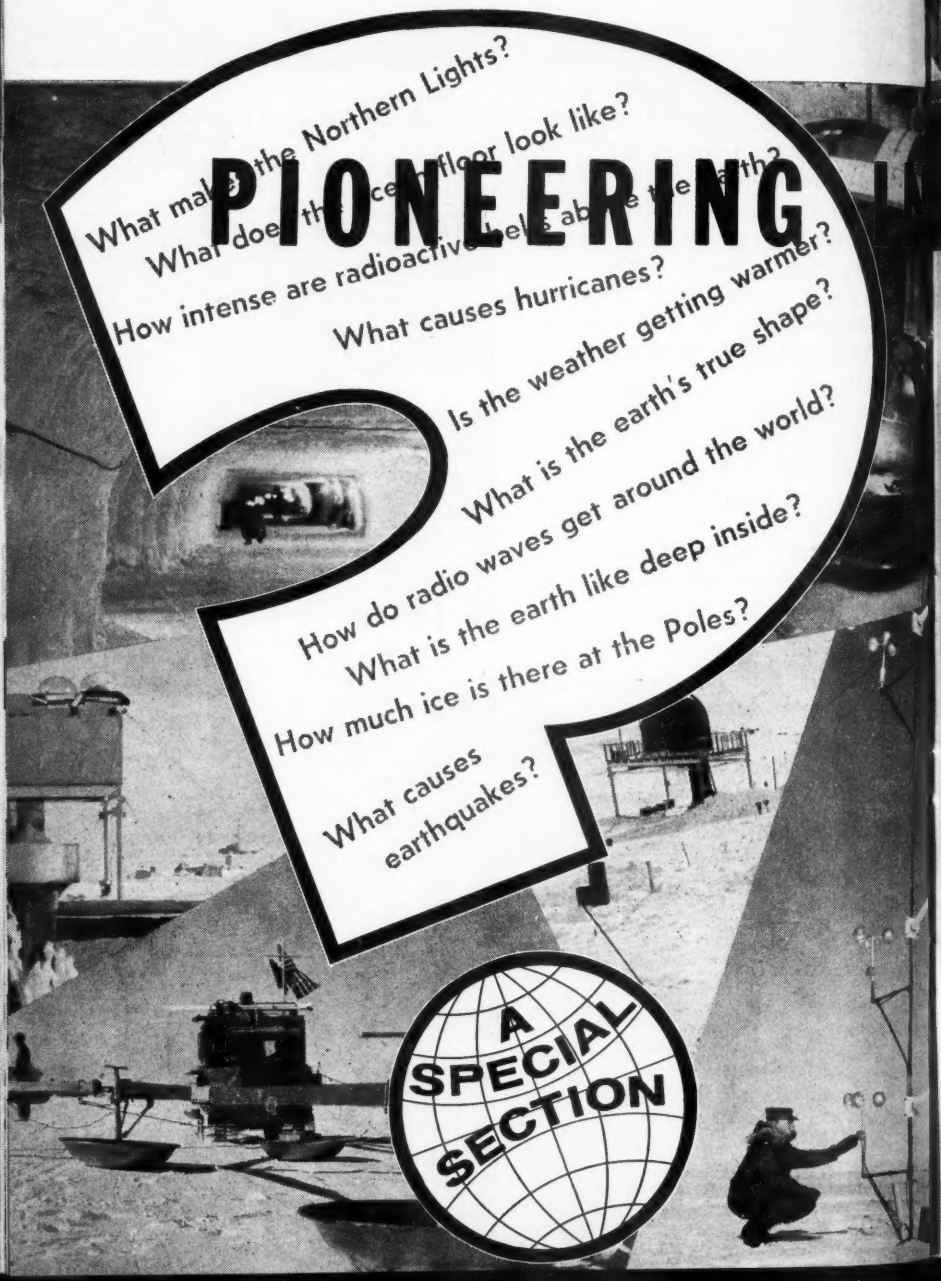
All members felt that they had a broader concept of military service and citizenship responsibilities. More than 15 percent were seriously considering applying for a commission at the end of their senior year. Each participant stated enthusiastically that she could recommend this program to other college women.

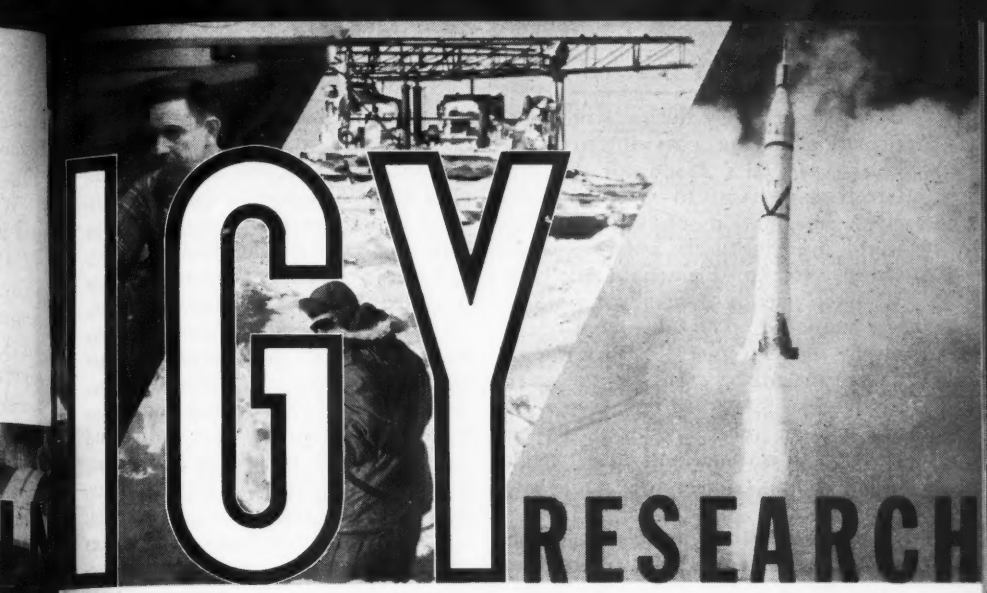
Already, there are young WAC officers now serving on active duty who received their initial Army training during the first two classes of this program. The Army has shown them—and evidently these American co-eds liked what they had seen.

Bugle calls are played and explained, above, while Cadet Shirley E. Smith, below, takes in sights during tour of historic Fort McClellan.

Having completed the four-week "Show Me" tour with 60 others, Cadet Smith prepares to leave WAC Center.

Fathoming the phenomena of space, sea and land mass, Army researchers gather data of long-range significance by





IGY RESEARCH

Clarence T. Smith

THE queries opposite may sound like those with which children habitually plague parents. But they are still questions which are not fully answered—questions that express the deepseated desire of man to know ever more about natural phenomena in the world about him. Further the answers to these questions are of great military as well as general scientific import.

It was to answer these and literally thousands of other more complicated questions that sixty-six nations of the world pooled their scientific energies during the 18-month International Geophysical Year (IGY).

Participation in the IGY fitted naturally into the historical pattern of research interests of the U. S. Army. Trail blazing of new frontiers, exploring remote geographical areas, searching the infinities of the world of science and opening passageways for man's continuing attempts at conquering his geophysical environment are a prideful part of Army pioneering traditions. Ever intent on accumulating knowledge that may be applied either to military or to peaceful purposes, Army leaders welcomed the peaceful research challenge of the IGY. (See "The Army Role in IGY Research," October 1957 DIGEST.)

Today those same leaders who began their planning, along with other scientists, as far back as 1951 may well be proud of the Army contribution to this far-ranging endeavor. For the IGY was undoubtedly man's most determined and concerted mass scientific effort to probe the fascinating mysteries of outer space, the tremendous forces of the sea, the frozen vastnesses of the two Poles, the dynamics of the world's land masses. The vast job of analyzing the tremendous accumulation of data will require several years and cost many millions of dollars.

This was not the first time that the Army engaged in such endeavors. In

CLARENCE T. SMITH is a staff member of the Army Research Office in the Office of the Chief of Research and Development, Department of the Army.

fact, it was largely during Army participation in the First International Polar Year (IPY 1882-1883) that the Greely expedition to Greenland excited imagination of scientists the world over in future polar research. On that occasion Lieutenant Adolphus W. Greely led a 25-man party which was marooned. The subsequent rescue by the cooperating U. S. Navy was an epic of the Arctic, coming as the seven survivors of the expedition were without food or fuel. Lieutenant Greely went on to become Maj. Gen. Greely, Chief Signal Officer, who pioneered Army work in Alaska.

Originally the world's scientists planned to conduct similar Years every half-century, and the Army again supported the Second International Polar Year in 1932-33. The Army Signal Corps established a College-Fairbanks Polar Year station near the Arctic Circle, installing communication facilities that linked the station with other IPY observation posts in a study of radio transmission problems.

RAPID scientific progress, partly attributable to the impetus given research and development during World War II and the years that followed, resulted in a suggestion for a third IPY earlier than originally scheduled in 1982-83. Meeting in October 1951 in Washington, D. C., the Executive Board of the International Council of Scientific Unions (ICSU) considered a proposal to this effect, and in May 1952 the ICSU bureau established a *Comité Special de l'Année Geophysique Internationale* (CSAGI).

By October of the same year the ICSU General Assembly approved the IGY plan for the period 1 July 1957 to 31 December 1958. These dates were selected because the 11-year solar cycle would reach its peak about that time. In the United States, a National Committee for the International Geophysical Year (USNC-IGY) was established by the National Academy of Sciences to plan and coordinate US. IGY activities. Funded largely through a grant of $43,000,000 from the Congress the USNC-IGY organized Technical Panels for planning research in eleven major scientific disciplines.

A basic agreement among nations provided for free interchange of information on results. Army planners were interested in information that might help to solve problems of adjustment to environmental conditions wherever soldiers may have to live and fight—problems related to human factors, man-machine capability, mobility, logistics, communications, and survival.

Army logistical support and services of civilian and military scientists, engineers and research technicians were to be concentrated in the Earth Satellite Program; Rocket Exploration of the Upper Atmosphere; Ionospheric Physics; Meteorology; Glaciology; Longitude and Latitude; World Days and Communications.

Additional effort was planned by the Army for the IGY program in Solar Activity, Cosmic Rays, Geomagnetism, and Aurora. Although not particularly active in the fields of Gravity, Seismology and Oceanography, the Army still was interested in information that would be accumulated through worldwide IGY study in these areas.

Early Studies

IN preparation for IGY activities, the National Bureau of Standards operated the IGY World Warning Agency (AGIWARN) at Fort Belvoir, Virginia. The agency was designed for maximum activity during predetermined World Days. Any observer anywhere in the world could flash a report of impending solar disturbances; scientists would then evaluate it and alert appropriate stations. AGIWARN also announced satellite launchings and orbital predictions and reported unusual geophysical events by facilities other than those included in the meteorological networks.

Three days before actual opening of the International Geophysical Year, the forecaster at Fort Belvoir received a report from a Russian observatory that a major sun flare appeared to be developing. An alert went out over four teletype circuits, one operated by the U. S. Army Signal Corps serving Alaska, Antarctica, Australia, Canada and Japan. Within 17 hours, thousands of observers were at their posts measuring the effects of the flare.

Before any of the preliminary IGY work could be accomplished, however, a vast amount of planning was necessary. Following approval in 1954 of Government support for U. S. participation, the Assistant Secretary of Defense for Research and Development designated a Coordinating Committee on General Sciences (CCGS) as the prime Department of Defense coordinating unit for the programs in which Defense had an interest.

The Secretary of the Army joined with the Secretaries of the Navy and Air Force in directing their operational and logistical agencies to work with CCGS. Inter-Service Task Groups, each with a representative of each of the Services, were established to correspond with the various Technical Panels set up by the USNC-IGY.*

By June 1956 the Army Technical Service representatives on the Inter-Service Task Groups were able to outline their contemplated activities.

Much of the Army program would be "internally funded in close cooperation and close coordination with IGY" —that is, in many fields activities would be carried on as normal operations. For example, the Signal Corps would continue its already established program in Aurora and Airglow studies at the University of Alaska and Cornell University. Similarly, existing activities would be carried on by various Army agencies in other fields.

These activities were numerous and varied, many having been conducted over a period of several years by the Corps of Engineers, Transportation Corps, Signal Corps, Ordnance Corps. In many cases, they furnished a working basis for actual IGY activities, as for example the development by Corps of Engineers of the electronic crevasse detector. This proved of inestimable value in Antarctica where the Navy called for its use in laying out trails through extremely difficult terrain. Also developed by the Army were electronic under-snow trail markers, wide-track vehicles for oversnow travel, and techniques for using snow and ice in construction. Deep core drilling work pioneered by the Engineers in Greenland established basic techniques used during the IGY in Antarctica.

IGY funds would support any necessary expansion undertaken expressly for IGY activities. Thus, with preliminary planning and organization accomplished and a clear understanding of objectives, the Army agencies were well prepared for their particular roles when IGY opened.

Earth Satellite Program

IN 1954 the CSAGI urged that consideration be given to launching of scientific earth satellites. Whatever progress of man in the conquest of his earth-bound environment may be recorded to the enduring credit of the

*Responsibility for coordinating Army interests was delegated to a Department of the Army IGY Planning Group, headed by Dr. James B. Edson, now Assistant to the Director for Research and Development, Department of the Army. He was succeeded early in 1958 by Dr. Hoyt Lemons, now Chief of the Geophysical Sciences Branch, Army Research Office. Dr. Leonard S. Wilson, currently Chief of the Environmental Sciences Division, Army Research Office, also figured prominently in planning rocket probes of the upper atmosphere, as well as glaciological and meteorological programs. They reported directly to Brigadier General Theodore J. Conway, at that time on the staff of the Chief of Research and Development, later Director of Army Research.

Principal parts of the electronic system of the cloud-cover IGY satellite are encased with foam plastic for insulation.

IGY, it seems destined to be chronicled most vividly as the dawn of the Space Age. Some have more romantically termed it the beginning of building a stairway to the stars.

In this sphere particularly, the Army played an extremely important part. In July 1955 President Eisenhower announced Government support of the program, and the Department of Defense was assigned prime responsibility for launching the satellites. Management responsibility was vested in the Navy and its Project Vanguard.

Following Russia's epochal success on 4 October 1957 with its launching of Sputnik I as the first earth satellite, the United States launched Explorer I on 31 January 1958, using the Army's four-stage Jupiter C. The story of how the Army launched the satellite after 84 days notice has been told and retold. All together more than 5,000 Army Ordnance scientists and engineers pooled their skill, with actual work being done at the Army Ballistic Missile Agency under direction of Dr. Wernher von Braun, and at the Jet Propulsion Laboratory under leadership of Dr. W. H. Pickering and Dr. J. E. Froehlich. (See "Army Explorer in Orbit," April 1958 DIGEST).

Subsequently, the Army launched Explorers III and IV and Pioneer III, and the Army's four-stage Juno II rocket launched Pioneer IV to orbit the sun. (See "Satellite to the Sun," June 1959 DIGEST).

Using satellites as research tools, IGY scientists have learned that:

Density of the upper atmosphere is at least ten times greater than previously estimated, and seems to vary with solar activity.

At altitudes of about 140 miles, temperature is considerably higher than can be explained by the earth's radiation.

There are at least two radiation belts in the upper atmosphere, but the radiation may not be too intense to prohibit shielding of astronauts.

Micrometeorites do not—as had been feared—present a great hazard to future space travelers.

SHORTLY after the IGY ended in December 1958, U. S. Army interests in continued space explorations were outlined by the Office of the Chief of Research and Development in the areas of communications, mapping and geodesy, weather data and early warning for national defense. At present the National Aeronautics and Space Administration has assigned to the Army responsibility for development of Saturn, a 1½-million-pound-thrust, cluster system rocket. Considered capable of lifting a 1-ton payload to a "soft" moon landing, the vehicle will be a long step toward future production of 10- to 15-million-pound-thrust rockets.

Rocket Exploration

CLOSELY allied to the satellite explorations in purpose, Army-conducted

research at altitudes ranging from 50 to 200 miles with rockets and rockoons (balloons from which rockets are fired) was spectacularly successful.

The U. S. phase of the IGY rocket research program was planned by a Special Committee established by the National Academy of Sciences. This Committee was comprised of eight members: two each from the Navy, Army and University of Michigan, and one each from the Air Force and State University of Iowa. Army members represented Ordnance Corps and Signal Corps.

In cooperation with the Canadian government and scientists, an IGY Rocket Firing Facility was set up at Fort Churchill, Canada. Ordnance Corps carried out a high-precision, geodetic survey—accomplished for the first time under the most difficult conditions in the arctic tundra—as a necessary prerequisite to the Signal Corps "grenade experiment" and the ballistic tracking facility which it instrumented and operated. Ordnance Corps ionosphere experiments yielded direct measurements of electron densities on a scale never before achieved anywhere.

Signal Corps provided "ballistic" radar tracking, communication and transmission, frequency monitoring and coordination, and meteorological support (excluding weather forecasting but including computation of ballistic winds and rocket impact). It also provided photographic services for all agencies.

Balloon launching of rockets (rockoons) enables a relatively small rocket to carry a useful payload of instruments from 75 to 100 miles high. The method is suitable for firings from ships at sea.

A Signal Corps-conceived experiment that yielded good results made use of falling-sphere soundings. The sphere was dropped from the rocket at its apex. Instruments measured the resistance drag at various levels as the sphere descended, thus permitting calculation of density of the atmospheric layers.

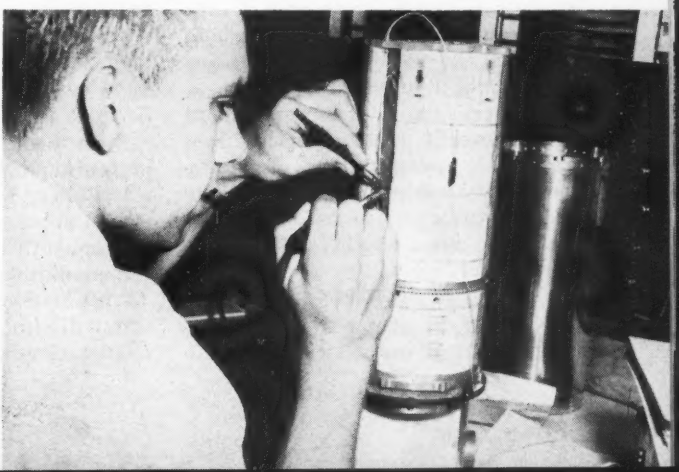
Another experiment designed by the Signal Corps was effective up to heights of 60 miles. This employed clusters of grenades—as many as 19—which were timed to explode at spaced intervals as the rockets ascended. Ballistic cameras recorded the precise location of each explosion, and recorders clocked the time of arrival of sound at plotted ground stations. Data was fed into an IBM computer to determine wind speeds, temperatures and other ionospherical data.

SOME specific findings showed that:

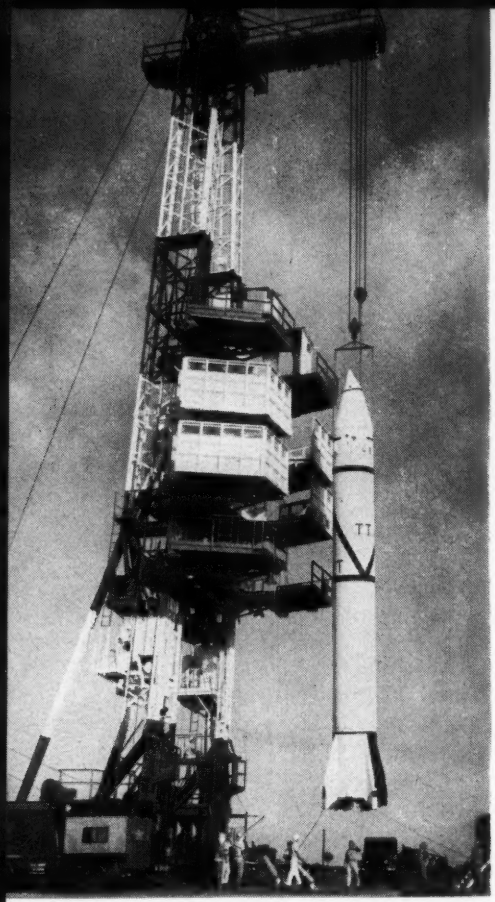
The D-region (the lowest) of the ionosphere is primarily responsible for radio blackouts during strong solar disturbances.

Density of the high atmosphere is under strong solar control.

Sun flares greatly affect the earth's magnetic field.



Explorer IV, being wired by technician at Army Ballistic Missile Agency, gathered valuable data for IGY researchers.



Army's four-stage Jupiter C, of type here being set in place at Cape Canaveral, was used to launch first U. S. satellite, Explorer I.

Distribution of gases, pressures and temperatures in the upper atmosphere vary greatly from lower altitude conditions.

Intensity of cosmic rays and X-rays, measured at various levels, is about equal at each Pole, decreasing near the Equator.

In general, results of the program at Fort Churchill and other locations broadened understanding of atmospheric relationships which may well enable meteorologists to make more reliable long-range weather forecasts.

Meteorology

IN the field of meteorological research, it is, of course, with the military aspects of actual weather forecasting that the Army is directly concerned. Significant results are anticipated from upper atmosphere research at Fort Churchill. Similar research was conducted at White Sands, Cape Canaveral and other United States launching points. Techniques established in IGY tests point to a sound basis for continued exploration of the upper atmosphere.

Launching of Vanguard II by the Navy on 17 February 1959 has been hailed as the forerunner of even more advanced meteorological satellites which may well be expected to have a revolutionary effect on the still rudimentary science of weather forecasting.

It has long been recognized by scientists that the sun's power turns the mighty engines of the sea, land surfaces and atmosphere by using the two polar ice masses (now estimated at 4,500,000 cubic miles, 90 percent of which is in Antarctica) and frigid winds as condensers to regulate the balance of the earth's heat and water budget. Without such a solar thermostatic control the tropics would be uninhabitable, polluted air from industrial complexes would snuff out life, much of the planet would be too cold to support human existence.

Consequently researchers want to learn more precisely how this weather engine functions, how atmospheric systems originating in the frigid zones can predictably produce good or bad weather in temperate zones, how to develop even more effective scientific methods of control. Obviously all this knowledge is of vital interest to the Army.

Prior to the IGY, many gaps existed in world meteorological charts and maps. Very little was known, for instance, about conditions in Antarctica. Consequently the IGY Weather Central established at the Little America (Byrd) Station was of importance. Integrated with IGY research in several related scientific disciplines, U. S. Army

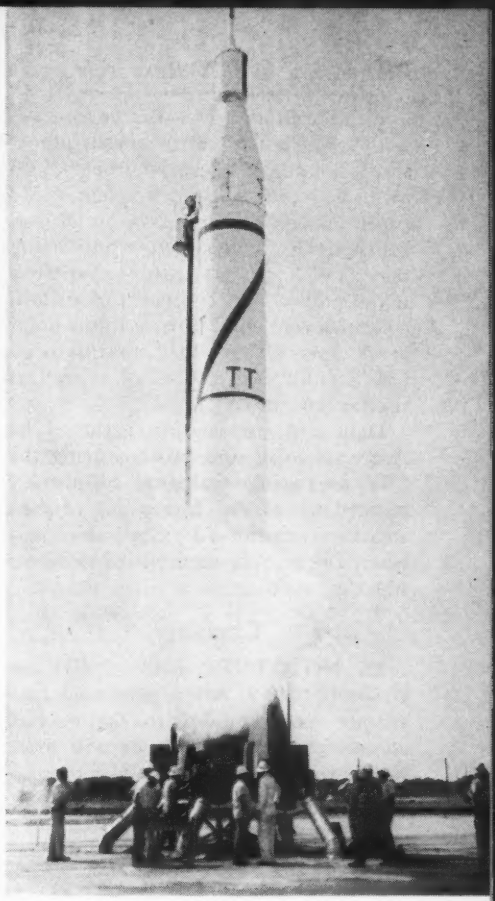
meteorological studies in polar regions supported the primary programs, with personnel from Signal, Ordnance, Quartermaster, Transportation and Corps of Engineers cooperating.

Six U. S. scientific stations, in addition to some 50 others operated by several other nations, were established in the Antarctic. All of the U. S. stations shared in thousands of rawinsonde balloon soundings. Data sent to ground station as the balloons ascended, and radar tracking of their course, indicated atmosphere circulation patterns, density at various levels, ozone and vapor content, and wind velocity of 150 to 200 miles an hour in storm areas.

It was found that weather varied greatly at northern and southern Antarctic stations. At Little America summer temperatures ranged to 30 degrees above zero F. while at the Amundsen-Scott Station at the South Pole the yearly average was 54 below. Coldest there, recorded on 17 September 1957, was 102.4 below. At Vostok Station, about 600 miles from the Pole, Russian scientists recorded 125 below—a world record—on 25 August 1958.

Data reflective of average and long-range weather trends in the Antarctic will take years to compile. In 19 months, observations were made that might normally have required 20 years by less intensive methods. Results have encouraged continued accelerated studies, and most of the 12 nations that operated stations have announced they will extend research into 1960.

IGY explorations supported previous conjectures that Antarctica, now 99 percent ice-covered, probably was substantially ice-free some 25,000 years ago, at the same time that much of the North American continent was sustaining the last Ice Age. It has been established that the Arctic has experienced an increase of about 10 degrees in the mean average temperature during the past 30 years. Similarly, in the Antarctic, an increase of about five



Crammed with sensitive instruments which will send back valuable scientific data, Explorer IV stands ready for launching.

degrees in mean average temperature since 1912 has been noted in IGY studies.

Answers to such phenomena are being sought. Knowledge of what caused the shake-up in the balance of the earth's heat and water budget some 20,000 or more years ago, may help with long-range calculations for the future. If all the polar ice should melt, for instance, the sea level would rise some 200 to 300 feet, inundating much of the earth's existing coastal areas.

THE Army is interested in a thorough study and understanding of meteorological conditions both in military

and nonmilitary areas. Better forecasting is obviously of military import since ground movement and operations are closely affected by weather, while upper air conditions affect aerial mobility and rocketry. Better forecasting may well prevent many disastrous floods, allow for civilian precautions against severe wind storms. In the polar areas especially, weather conditions affect possible future civilian as well as military air travel.

Data and information gathered by Army scientists and others during the IGY are being evaluated to provide better means of forecasting future weather conditions; they also may point the way to methods of influencing the weather.

Glaciology

IN NO OTHER field of IGY activity did U. S. Army personnel contribute more notably to the over-all success of the program, or win more public recognition than in glaciology—a field closely related to the meteorological studies conducted in the polar regions. Army activities centered in Antarctica, but also included studies in the Blue Glacier of the Olympic Mountains, Washington, the McCall and Lemon glaciers in Alaska, the Greenland Icecap and the floating ice islands near the North Pole.

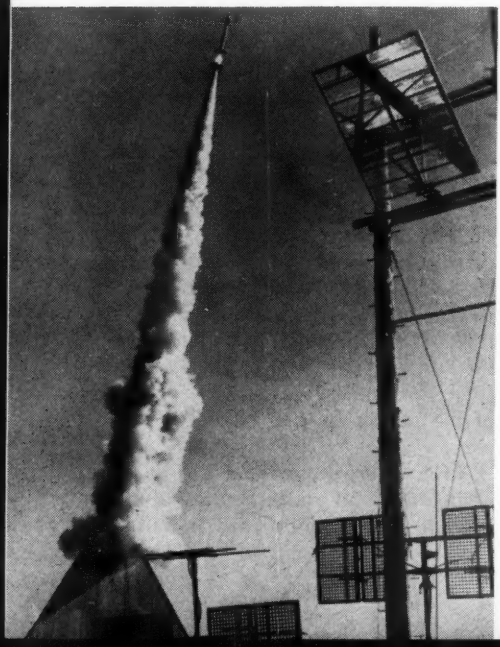
Studies underway in 1954 contributed to glaciological studies in the IGY and, even before the official start, the Army shared in Deep Freeze I, which was staged in preparation for IGY Antarctic explorations. A six-man Signal Corps research team directed by Mr. Amory H. (Bud) Waite of the Radio Communications Division, Research and Development Laboratories, arrived at Kainan's Bay on 28 December 1955. There they established Camp Cold Bottom a mile from Station Little America V, then being built.

The group tested Very High Frequency (VHF) communications equipment, radio wave atmospheric propagation, power units, cold weather clothing, photographic equipment, over-snow vehicles, and made meteorological observations. Even more extensive studies were made in support of Deep Freeze II the next year by Mr. Waite and eight Signal Corps soldier scientists. They probed feasibility of communication through the neve (partially impacted granular snow at the upper end of a glacier) to depths of 25 feet, made measurements of humidity, temperature and winds.

Also in preparation for actual IGY operations, an Army-Navy Trail Party on Deep Freeze II duty had the mission of establishing a trail suitable for heavy tractor trains from Little America V to Byrd Station—some 553 miles by air but 647 as the Trail Party bulldozed over and through crevasses.

Planning was based on Transportation Corps experience in Greenland. Three officers and three enlisted men, all volunteers, were sent by the Chief of Transportation on the Army-Navy

Laden with 19 high-explosive "firecrackers," an Aerobee rocket soars aloft to make weather observations 60 miles above Fort Churchill.



Scientist on "Operation Deep Freeze" makes observation from a snow-cat loaded with skis and poles to cross crevasses.
U. S. Navy Photo

trail party mission. Crevasse detectors developed by the Corps of Engineers proved invaluable in threading the trail through an extremely hazardous 7.5 mile stretch of crevasses. Weasel snow vehicles and caterpillar tractors towing 20-ton sleds formed a tractor train capable of hauling more than 200 tons of materials. Two successful expeditions in January and February 1957 established the U. S. capability of transporting heavy tonnages over Antarctic terrain on a scheduled basis.

All in all, in 1957 and 1958, more than a dozen additional traverse expeditions representing eight nations criss-crossed the Antarctic. Their combined findings lifted much of the veil of mystery from large sections of the previously uncharted area.

SHORTLY before the official opening of IGY, a dramatic incident occurred in December 1956, in which an Army scientist figured so prominently that he later received the Navy Distinguished Civilian Service Award. At that time, about half the complement of scientists and technicians who were completing the South Pole Station were cut off when unexpectedly early warm weather began melting the ice runways from which supply planes of the U. S. Air Force were operating.

A hurry call was placed by Rear Admiral George E. Dufek to the Corps of Engineers. Dr. Andrew Assur of the Army Snow, Ice and Permafrost Research Establishment (SIPRE) was rushed from Greenland. His expert knowledge of ice mechanics enabled him to instruct the Navy Seabees in methods of using fresh ice to repair the potholes that had developed. The field was soon again in use.

According to Dr. Paul Siple, then serving as Scientific Leader of the Amundsen-Scott Station at the Pole, had the runways not been repaired in time, the scientists probably would have been marooned with insufficient food and fuel. While they probably could have lasted it out, conditions would have been extremely perilous—and any thought of scientific accomplishments would have been remote.

Participating Scientists

DR. SIPLE, an Army scientist for 17 years, and currently Scientific Advisor to the Director of Army Research, Office of the Chief of Research and Development, was on loan from the Army to the USNC-IGY. Thus his experience was typical of many another Army scientist. In recognition of his IGY services, he received the Department of Defense and Department of Army Distinguished Service Medals, the David Livingstone Award of the American Geographic Society, the Hubbard Medal of the National Geographic Society, the Patron's Medal of the British Royal Geographic Society and four other honorary degrees from colleges and universities.

Although probably the best known of the participating Army personnel—

Army Engineer prepares to set off an under-snow detonation to gather data on structure of Greenland Icecap, which here is about 10,000 feet thick.

he had served as a selected Boy Scout on the Admiral Byrd expedition to the South Pole in 1929, later on other Byrd expeditions and then gained fame in his own right as an explorer—Dr. Siple was only one of many who had considerable experience in the Arctic.

Amory Waite of the Army Signal Corps, for instance, had led or been a member of half a dozen expeditions. Lt. Col. L. G. Smith of Ordnance Corps, who directed the Inter-Service Support Coordinating Group and served as Project Officer for the entire Fort Churchill IGY rocket program, has been selected for award of an Oak Leaf Cluster to the Legion of Merit in recognition of his outstanding contribution to success of the Army program of rocket explorations of the upper atmosphere.

Officers selected for the Army-Navy Trail Party, mentioned above, included Lieutenant Phillip Smith, Major Merle Dawson, and Major Palle Mogenson. Mogenson later took over the IGY station leadership at the Amundsen-Scott Station.

Representing the Quartermaster Corps Research and Engineering Laboratories, Paul Dalrymple, Dr. Fernand de Percin, and Sigmund Falkowski planned a micrometeorological program at Little America V and Amundsen-Scott Stations. Dalrymple was provided a grant by the National Research Council through the US-IGY Glaciological Center at Ohio State University to process data he collected in Antarctica. For his work, Dalrymple was awarded the Department of the Army Meritorious Civilian Service Award.

Also associated with the Quartermaster Corps was Robert Forbes, selected as observer for Deep Freeze I. His lengthy report titled "The Effects of Antarctic Environment on Operations in the Ross Sea Region" contained valuable information on food, clothing, and physiological reactions in polar cold for later IGY expeditions.

Still other Quartermaster Corps personnel who earned a place on the Army IGY roll of honor are Captain Jackson M. Bryant, who evaluated food, clothing and equipment; Dr. Fernand de Percin, senior meteorologist on a U. S. Air Force-sponsored expedition to Lake Peters in the Brooks Range of Alaska; Dr. Jan Vanderbie, John Slauta, Robert Woodbury, Theodore Bailey, Edward Barron, Thomas Dee and Herman Madnick.

Among Quartermaster activities in support of IGY was a contract with the American Geographic Society for research necessary to prepare an "Atlas of Mountain Glaciers in the Northern Hemisphere." Many of these individuals contributed their findings.

A partial list of those who distinguished themselves while representing the Signal Corps in its many scientific activities would include, in addition to Mr. Waite, several other chief planners —Dr. Hans aufn Kampe, Dr. Helmuth Weickman, William Stroud, Lt. Col. F. E. Watras, and Mrs. Frances Whedon.

ALTHOUGH research in the life sciences was not a primary objective of IGY Antarctic studies, it still was encouraged by committees of several countries. At Wilkes Station, Scientific Leader Dr. Carl R. Eklund took great personal interest in such studies. Now a research analyst in the Environmental Sciences Division, Army Research Office, he had 20 years' experience with the U. S. National Parks and the Fish and Wildlife Service. Largely through his activities, birds of different species were shipped out. A frozen Ross Sea seal was brought to the U. S. National Museum, while brains of Adelie penguins and the South Pole skua (a type of gull) were sent to Walter Reed Army Institute of Research in Washington. Blood samples of Ross and leopard seals were sent out for cancer studies. Dr. Eklund banded more than 600 types of birds. He also developed a technique of inserting a telemeter in penguin and skua eggs to measure temperatures during the incubating period —a feat that has attracted world-wide attention of scientists.

WHILE much of the dramatic polar research work of Army scientists was centered in Antarctica, important activities were also carried on in the Arctic areas. These studies probed deeply into virtually all of the geophysical sciences.

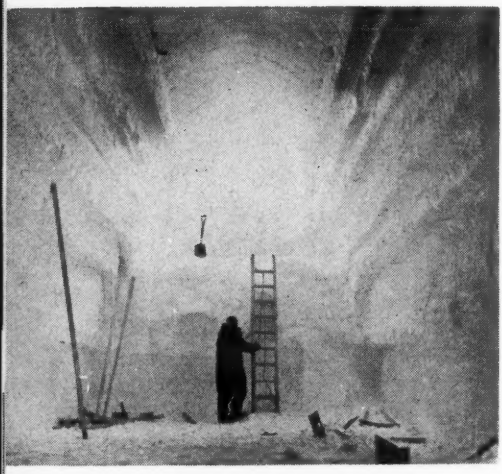
In preparation for polar explorations during IGY, the Corps of Engineers invited glaciologists from all Western World nations to a two-week training course at Camp Tuto, Greenland, in July and August 1956. Project Leader Richard H. Ragle and Dr. Henri Bader, Scientific Director of the U. S. Army Snow, Ice and Permafrost Research Establishment, supervised training to insure standardized snow measurements, use of equipment and survival techniques.

Traverse party scientists in Antarctic prepare a fifteen-meter hole in which a seismic charge will be set off to gather ice data.
U. S. Navy Photo

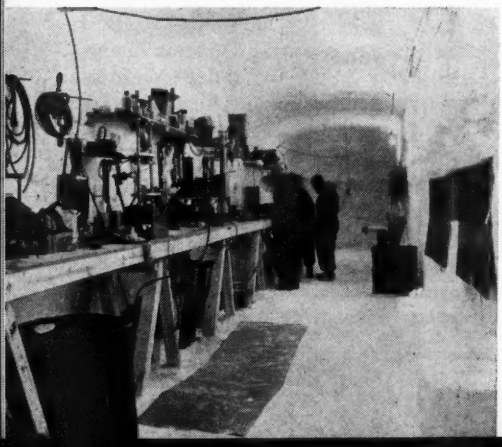
Though not listed as part of the actual IGY, important studies were made by the Corps of Engineers on the Greenland Icecap to demonstrate that snow and ice can be used for building.

U. S. Navy Photo

From Pole to Pole, scientists worked on varied IGY projects. This group explores an Antarctic ice cave filled with stalactite-like icicles . . .



. . . while in the Arctic, Army Engineers developed methods for cutting deep covered trenches for under-snow camps, shop, shelters.



As in Antarctica, deep core drillings provided an historical picture, layer by layer, which permitted scientists to draw sound conclusions about future climate evolution and about formation of glaciers. In Antarctica samples taken from a thousand-foot hole indicated that ice at that level had fallen as snow about the time of Charlemagne, some 1,500 years ago. In the Arctic, cores sent to Walter Reed Army Institute of Research showed evidence of the Mount Katmai eruption in Alaska (1912) buried under 32 feet of ice. Ash from the Krakotoa eruption off the coast of Java in 1883 was found at another layer. Fallout from thermonuclear tests made in 1954, and variations in the oxygen isotope, also were analyzed.

Continuing measurements of atmospheric opacity were made at the Thule base. Similar work was done at five other stations in Alaska, Canada and in Kiruna, Sweden. "All sky" cameras also operated at Thule, several stations in Alaska, Fletcher's Ice Island, and Drifting Station Alpha.

Studies in long-range magnetic wave propagation in the Arctic were of interest to the Army and of great potential benefit also to civilian communications. Much of the same is true of Signal Corps vertical incidence measurements, "whistlers" and "back scatter" studies.

Longitude and Latitude

CONTRARY to popular belief, precise determination of relative position of the earth's features, the orbit of the moon—even the exact size and shape of the earth—has not yet been completed. During World War II, for instance, operations disclosed that numerous Pacific Ocean islands were more than a mile away from positions indicated on navigational maps. The IGY program sought to reduce such errors to under a hundred feet.

Instrumented earth satellites, dual-rate moon position cameras, supersensitive astrolabes, electronic computers

". . . It is the determination and perseverence of a people toward its goals and toward international cooperation which alone can bring about realization of the hopes of mankind."

Dr. Alan T. Waterman, Director, National Science Foundation, in a report to President Eisenhower.

capable of converting enormous quantities of data into problem solutions—all these were new tools of IGY longitude and latitude studies. From IGY studies of satellite orbits, further evidence has been gained that the earth is not a perfect sphere, but may be slightly pear-shaped. Continuing studies should show whether or not the continents "drift," as has sometimes been claimed. It will take many years to evaluate all data.

The Army Map Service cooperated in extensive studies requiring triangulation measurements of the entire Western Hemisphere — a program in which it had already performed a vast amount of work. The IGY program was coordinated by the Inter-American Geodetic Survey. Army Map Service's Project Vanguard Task Force, headed by Lt. Col. W. E. Smitherman, was organized to participate.

Telemetry recordings from the Minitrack "picket fence" stations established for observing Vanguard satellites provided a geodetic framework for activities of the Task Force. Orbital data compiled at the Vanguard Computing Center in Washington yielded triangulation coordinates for accurate measurements of longitude and latitude.

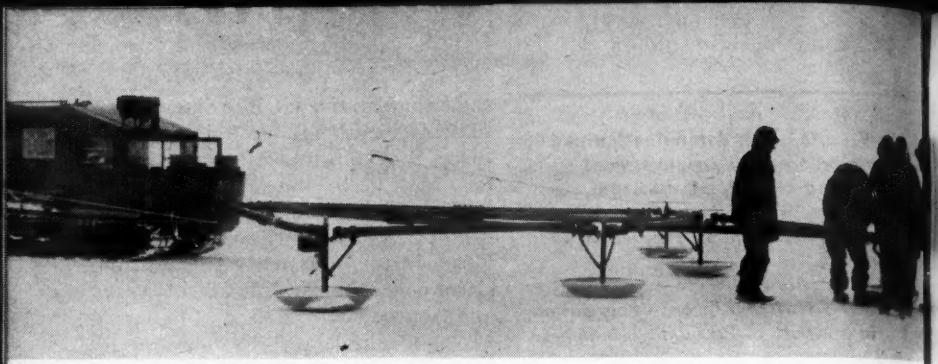
Reversing the application of techniques used for Project Vanguard measurements, Army Map Service originated and implemented "Project Betty." Orbital constants determined from the precisely positioned Minitrack stations enabled scientists in Project Betty to make comparative satellite observations from Pacific islands. As a result, many places well known to American servicemen have been located more accurately, including Luzon Island in the Philippines, Kwajalein in the Marshals, Guam in the Marianas, Ponape in the Carolines, and the islands of Wake and Samoa.

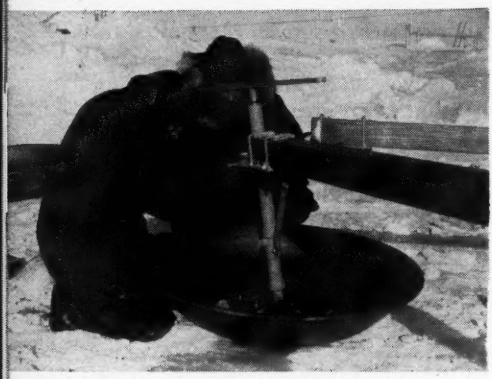
The Minitrack picket fence of observation stations was established along the 75th Meridian from Blossom Point, Maryland, to Santiago, Chile. Interest in the volunteer satellite observation program was greatly stimulated by launching of Russia's Sputnik I. In such programs as Moonwatch and Moonbeam, volunteers contributed importantly to success of the tracking effort. Of some 275 Moonwatch stations established in nations supporting IGY, about 100 were in the United States.

Although the Office of Naval Research was in charge of the program for Project Vanguard, the Minitrack system was operated by the Army Signal Corps in cooperation with Army Map Service. Stations were built by the Army Corps of Engineers while the Army Ordnance Corps supplied many electrical components.

Headquarters of the Minitrack system was at the Naval Research Laboratory in Washington, D. C. An optical satellite tracking network was established by Smithsonian Astrophysical Observatory. Moonbeam observers used both the Minitrack radio tracking and telemetry network and the Microlock system. The latter was developed by Jet Propulsion Laboratory while it was still under U. S. Army control.

The U. S. Army Signal Corps Research and Development Laboratories at Fort Monmouth and at Belmar, New Jersey, further utilized Project Diana and the Space Sentry in satellite tracking and moon observation. These huge, saucer-shaped electronic devices, mounted at an angle to scan the sky as they rotated in following the path of satellites, achieved amazing results. Diana





Crevasse detection equipment developed by Army was called into use in Antarctic regions to help find a safe trail to the Byrd Station.

bounced signals off the moon, while Space Sentry emitted signals attuned to the frequency of instrumentation in the satellite. With this equipment scientists could accurately calibrate orbital data.

World Days and Communication

THE World Warning Agency at Fort Belvoir, which began functioning even before actual start of the IGY, also operated in support of World Days, on which observations of atmospheric phenomena related to various IGY scientific studies were accentuated.

Three World Data Centers were set up to receive and process information.

World Data Center A was established in eleven institutions and eight cities of continental United States and Alaska, under direction of the U. S. National Academy of Sciences with headquarters in Washington, D. C. Center B was controlled by the Soviet Union with three of its four substations located in Moscow. Center C was based in Japan, Australia and eight nations of Western Europe: England, France, Germany, Spain, Switzerland, Italy, Belgium and Denmark.

Each of the three World Data Centers compiled reports for the others. Three complete sets of data on the worldwide program thus were assembled to provide scientists of all nations a wealth of research material for decades to come.

Regular World Days (RWD) numbered three or four each month—two during the new moon, others near the moon's quarter phase or during periods of prominent meteor showers. Alerts were broadcast when an unusually active solar region was indicated. A Special World Interval (SWI) was called on 24-hour notice when significant geomagnetic disturbances appeared imminent. World Meteorological Intervals (WMI) consisted of 10 consecutive days each quarter, including the solstice or equinox day, and three RWD's.

Other Scientific Disciplines

WHILE the above categories were the principal fields in which the U. S. Army cooperated actively with equipment support and personnel, the Army also contributed to some extent or had a direct interest in other scientific disciplines studied during IGY—Oceanography, Seismology and Gravity, Geomagnetism and Cosmic Rays.

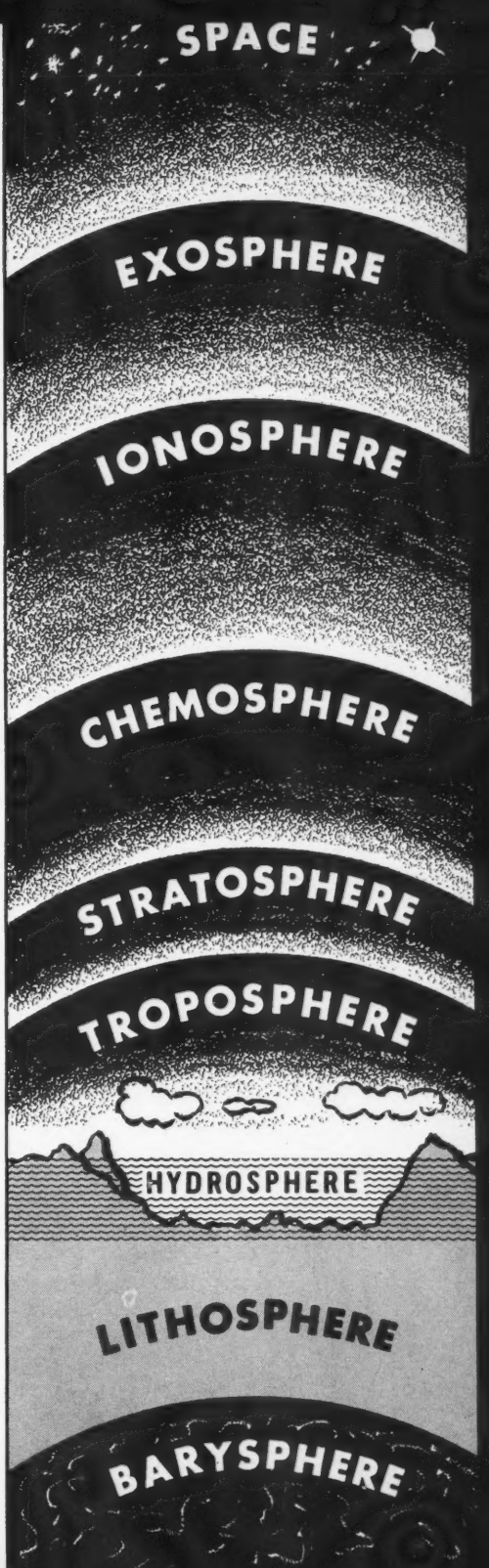
"The Army is concerned with all areas of scientific investigation, and any scientific information is of immediate or long-range value to the Army. Our business is not only to wage war. Our interest in science is related to all human problems. The scope of our interest is enormous. No other organization within my knowledge has the broad interest in all areas of scientific research and development the Army must have to do its job of protecting and helping to build our Nation."

Dr. Harold C. Weber,
Chief Scientific Advisor,
Office of the Chief
of Research and Development.

Oceanography. In this field the Army is particularly concerned with studies pertaining to on-shore currents, subsurface features and changing shore formations. Army work in this field was accomplished through contract with the University of California Scripps Institute of Oceanography and several other research agencies.

IGY oceanography research has provided impetus for continuing studies on an expanded basis by many countries. The International Council of Scientific Unions (ICSU) has organized a Special Committee on Oceanographic Research (SCOR). In the United States, the Committee on Oceanography of the National Academy of Sciences has prepared a report emphasizing defense requirements in recommending a 10-year, $651,000,000 expansion program for ocean research.

All together, more than 100 ships, representing 20 countries, and some 350 tidewater stations combined efforts in the IGY oceanography program. Discoveries of major significance



From deep under the sea to reaches beyond the atmosphere, Army interests ranged in the quest for scientific information during the IGY.

were numerous and excitingly thought-provoking. Not far from coastal areas of the Philippine Islands and Guam, trenches in the ocean floor more than 34,000 feet deep were probed. The Tongo Trench stretching some 2,000 miles in the Pacific is deep enough to contain seven Grand Canyons.

In another area, the Chile Trench is over 25,000 feet deep, contrasted with the inland area about 100 miles away where the Andes tower around 23,000 feet. Several mountain ranges were found under the sea—one in the Pacific was about 1,000 miles long and 200 miles wide.

Three extended cruises by Scripps Institute of Oceanography scientists were made to study current systems in the Pacific equatorial region. While it had long been known that a surface current flowed from Panama toward Asia, scientists now were surprised to find a current flowing in the opposite direction from 200 to 1,000 feet deep. This equatorial undercurrent carries about a billion cubic feet of water a second—about a thousand times the flow of the Mississippi River.

Measurements of the earth's crust below the sea revealed that it ranges from 2.5 to 7.5 miles in depth. Core samples were taken from buried mountain ranges and from flat areas of the ocean floor. One challenging discovery was that millions of square miles of the Pacific Ocean floor have manganese and iron containing up to one percent of cobalt mixed with copper—at an estimated value of about $500,000 per square mile. Mining possibilities are being studied.

Photographs were taken as far as 14,400 feet below the surface. Living organisms were recovered from depths of 16,200 feet. Continuing measurements of heat flow from the earth's crust may help indicate long-range weather trends, as well as turbulences which might later cause undersea earthquakes. Such quakes are known to be the origin of disastrous tidal waves.

Seismology and Gravity. The worldwide seismology network developed during the IGY included 3,000 stations in 85 nations. Major stations using sensitive new long-range seismometers and seismographs capable of recording ground movements smaller than two-billionths of an inch, hold forth the hope of providing accurate warnings

Keeping the wind-swept trail marked by flags set at intervals was a cold and difficult job carried out by men utilizing over-snow vehicles in the frozen wastelands. U. S. Navy Photo

Army scientists helped keep runways in condition to allow planes to continue supply operations at the South Pole base.

U. S. Navy Photo

to minimize loss of life in future earthquake disasters.

Recordings taken during the IGY, in large part, were related closely to polar explorations, glaciology and oceanography. IGY traverse teams in both polar regions gathered information that filled many previously existing gaps in the seismic network. Scientists on Fletcher's Ice Island and Drifting Station Alpha also helped to fill in blanks for areas over which these stations drifted.

As thickness of the earth's crust, gravity and range of heat flow were measured under the sea, so land teams made correlative studies across much of the earth's surface. Sensitive extensometers planted in solid rock in mountain tunnels are providing information on long-range changes in earth strain, including tidal effects produced by gravitational pull of sun and moon. These instruments also measure free vibration of the earth. Better knowledge of the dynamics deep in the earth's interior which produce massive long-range changes in crustal structure —stresses which cause mountains to rise or sink—may reveal when earthquakes can be expected.

Geomagnetism, Cosmic Rays. It is known that cosmic rays are electrically charged high energy particles developed within our galaxy and that they constantly bombard the earth. Intensity of the radiation undergoes changes with time, and the changes are associated with phenomena on the sun. Such large-scale changes have become a central problem of interest not only for understanding cosmic ray and solar effects, but also because solution of the problem is leading to greater knowledge of magnetic fields in outer space.

Investigation has disclosed that there is a magnetic flow of waves in two great circles around the earth at the North and South Poles. Existence of still a third field—an electrojet stream of limited horizontal dimensions near the equator—was substantiated in the IGY.

JUST how great will be the ultimate rewards for the Army from IGY par-

NATIONS PARTICIPATING IN IGY RESEARCH

Argentina
Australia
Austria
Belgium
Bolivia
Brazil
Bulgaria
Burma
Canada
Ceylon
Chile
China, Republic of
Colombia
Cuba
Czechoslovakia
Denmark
Dominican Republic
East Africa
Ecuador
Egypt
Ethiopia
Finland
France
German Democratic Republic
German Federal Republic
Ghana
Greece
Guatemala
Hungary
Iceland
India
Indonesia
Iran
Ireland
Israel
Italy
Japan
Korea, Democratic Republic of
Malaya
Mexico
Mongolian Peoples Republic
Morocco
Netherlands
New Zealand
Norway
Pakistan
Panama
Peru
Philippines
Poland
Portugal
Rhodesia, Southern
Rumania
Spain
Sweden
Switzerland
Tunisia
Union of South Africa
Union of Soviet Socialist Republics
United Kingdom
United States of America
Uruguay
Venezuela
Vietnam Democratic Republic
Vietnam (Republic)
Yugoslavia

ticipation will be revealed by the unfolding years. Certainly the questions of interest to the Army have not been fully answered; indeed, some can never be fully answered. But gigantic steps were taken in accumulating new information on which to base a better understanding of natural phenomena over the coming years.

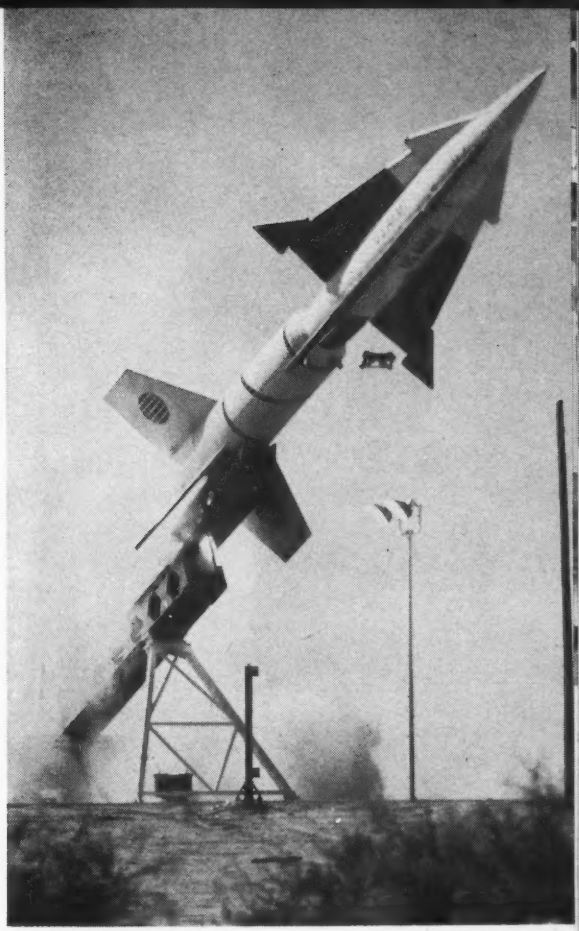
Out of its activities during the IGY, the Army will benefit in fields of mobility, survival, communications, food, clothing, and actual firepower. At the same time, as it has historically through all its existence, the Army has tested its organization and trained its manpower while adding to the stockpile of civilian scientific knowledge that will be of general benefit to the entire American public.

It may truly be said that the U. S. Army IGY effort played a vital part in what history will call the beginning of the Space Age—or, as some would put it, the beginning of building a stairway to the stars.

Upper Atmosphere Study

Construction of a radar equipped with a 1,000-foot-diameter spherical antenna for use in ionospheric measurements has been authorized by the Advanced Research Projects Agency of the Department of Defense. The Army Corps of Engineers will be responsible for land acquisition, development of the site and installation of the radar in Puerto Rico. The Air Research and Development Command has been directed to let a contract to Cornell University for design and construction and to administer the contract in behalf of ARPA. Cost of the installation is estimated at $4.5 million.

While the radar will be funded by ARPA as a means of studying the midcourse effects of atmosphere on ballistic missiles, it will be available for use by other scientific agencies. Called a "vertically directed ionospheric radar probe," the huge device will use "incoherent backscatter" radar to measure electron density and temperatures as a function of height and time; to measure auroral ionization, detect transient streams of charged particles coming from outer space, explore existence of a ring current, obtain radar echoes from Mars and Venus, and to map areas of the moon and sun. The tropical site will facilitate observation of the planets.



NIKE-ZEUS Test Vehicle Rides the Range

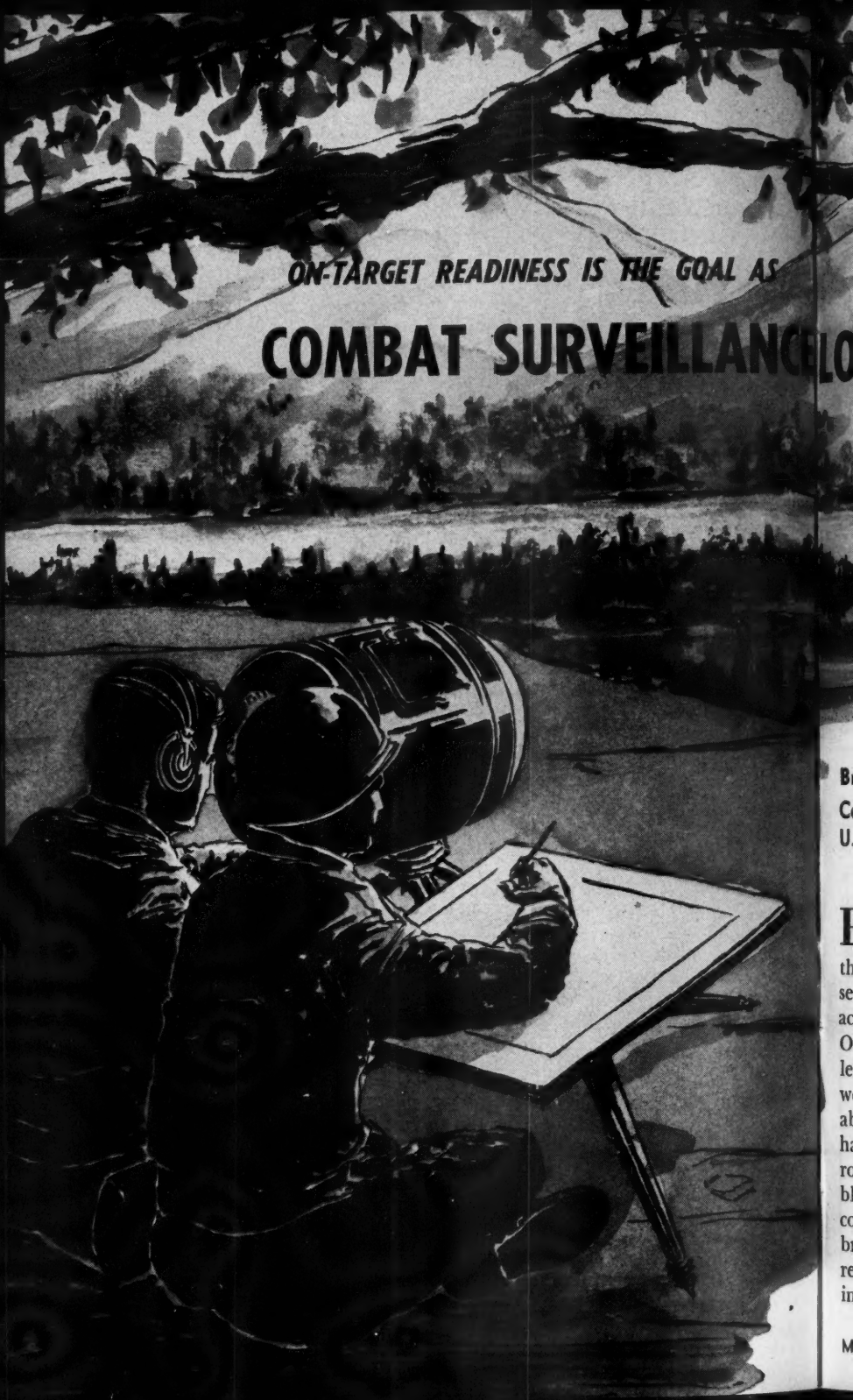
DEVELOPING 450,000 pounds of thrust and using the largest single-grain solid propellant booster ever fired, an early test vehicle of the Army's Nike Zeus anti-missile missile was launched 16 December at White Sands Missile Range, New Mexico.

The test shot—one of a series of research and development firings—was conducted as part of an orderly development of the Nike Zeus system involving the most advanced techniques for target acquisition and tracking ever contemplated.

The Nike Zeus vehicle flew an unguided ballistic course with guidance fins locked in zero-degree position. The test was designed to make evaluation of structural temperature and erosion, and to study launching operations.

When developed, Nike Zeus will be an anti-missile missile intended to intercept enemy intercontinental ballistic missiles before they reach their targets. The Army Rocket and Guided Missile Agency, Huntsville, Alabama, is developing agency for Nike Zeus. The primary contractor, Western Electric, and sub-contractors, Bell Telephone Laboratories and Douglas Aircraft Company, were responsible for the launch. The actual firing was conducted by Douglas.

Above is an early test model of the U. S. Army Nike Zeus, of the type which was test fired.


ON-TARGET READINESS IS THE GOAL AS
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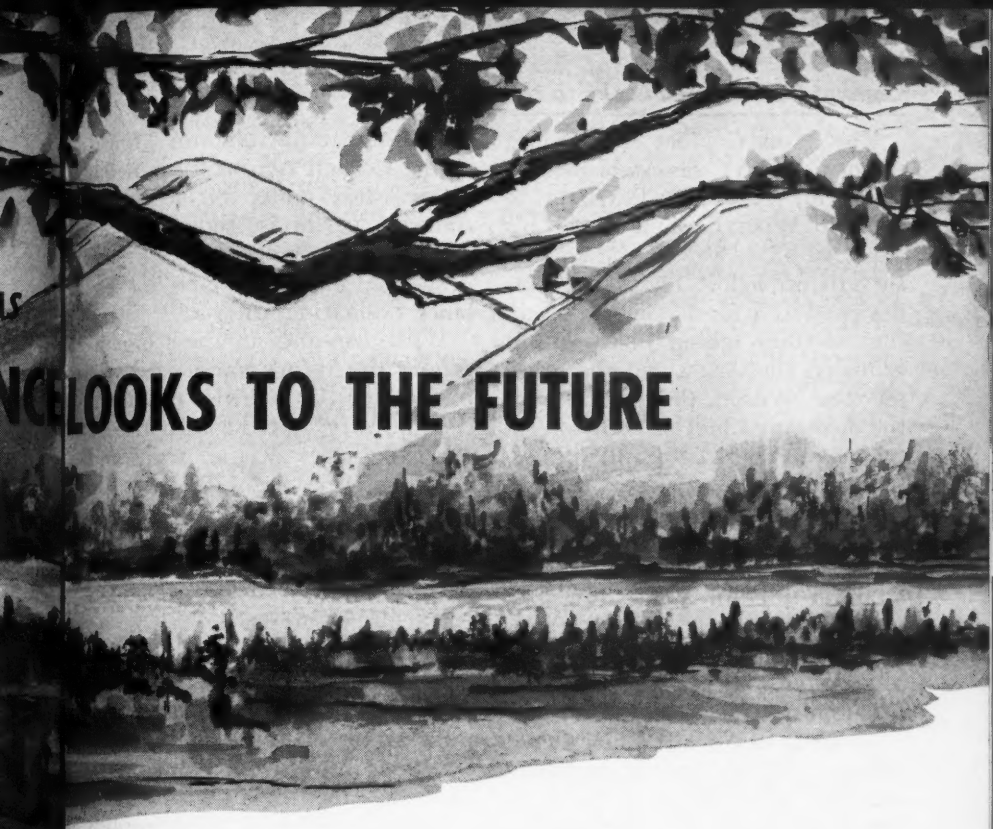


LOOKS TO THE FUTURE

Brigadier General William M. Thames
Commanding General,
U. S. Army Combat Surveillance Agency

PARADOXICALLY, U. S. Army advances in the missile field in the last two decades have generated several significant problems while achieving major tactical advantages. One problem, or complex of problems, stems from the fact that Army weaponry has outstripped our ability to observe the enemy. This has left our Army in a situation roughly comparable to that of a blindfolded dart thrower. The compelling implications have brought about the Army's present research and development program in the combat surveillance field.

Department of the Army defines combat surveillance as "a continuous (all weather, day and night) systematic watch over the battle area to provide timely information for tactical ground operations." To fulfill this requirement, ACSA engages in a program of research and development to produce both airborne and ground surveillance systems. Efforts in this field fall under the staff responsibility of the Chief of Army Research and Development and under the direct supervision of the Chief Signal Officer.

Combat Surveillance Looks to the Future

The Army Combat Surveillance Agency (ACSA) was established by the Army Chief Signal Officer in 1957 to supervise and direct his effort in all phases of the combat surveillance field. The Agency was designed as a focal point to monitor activities taking place within industry, the Army and the other services. Within the guidance of the Assistant Chief of Staff for Intelligence, who has overall staff responsibility for combat surveillance, it formulates programs for development of a combat surveillance capability for the Army. It surveys established requirements, interprets these requirements into terms meaningful to industry, and oversees the ensuing developmental program.

As an agency of the Chief Signal Officer, ACSA has immediately available the assistance of the U. S. Army Electronic Proving Ground, Fort Huachuca, Arizona, and of the U. S. Army Signal Research and Development Laboratories, Fort Monmouth, New Jersey.

The Agency is also supported by two civilian groups. Project Michigan, a research group of the University of Michigan, conducts basic research in surveillance under contract with the Army Signal Corps. The Combat Surveillance Project of the Cornell Aeronautical Laboratory, also under Signal Corps contract, performs studies, recommends surveillance development programs, and formulates surveillance evaluation criteria.

With assistance of these organizations, the Agency is well equipped to monitor the facilities of American industry and the activities of other branches of the Army and the other military services, to insure unity of effort in the combat surveillance field.

Objectives

BECAUSE ACSA is striving to produce certain new capabilities in an area where none of significance previously existed, it has been necessary to phase its development program into current, mid-range, and long-range time periods. The program is designed to accomplish the following:

Current time period. ACSA will meet immediate requirements by providing the Army with the best equipment now available or in the final stages of development. In other words, the initial equipment will be largely "off the shelf" equipment adapted as necessary to enable its use in the surveillance role.

DIGEST INDEX AVAILABLE

AN INDEX to the 1959 issues of ARMY INFORMATION DIGEST has been published in matching format, and selective distribution has been made. Individuals and organizations requiring additional copies may obtain the 1959 Index by writing to the Editor, Army Information Digest, Cameron Station, Alexandria, Virginia.

The surveillance radar and photographic equipment that is now finding its way into Army units illustrates the partial fulfillment of this objective.

As the current objective is attained, and as rapidly as areas are determined in which "first generation" surveillance equipment requires improvement, ACSA can accelerate concurrent efforts to proceed to its second objective. We will no longer be like the caveman who had to design the first stone axe—but more like his descendant who had only to improve upon the one that had already been designed.

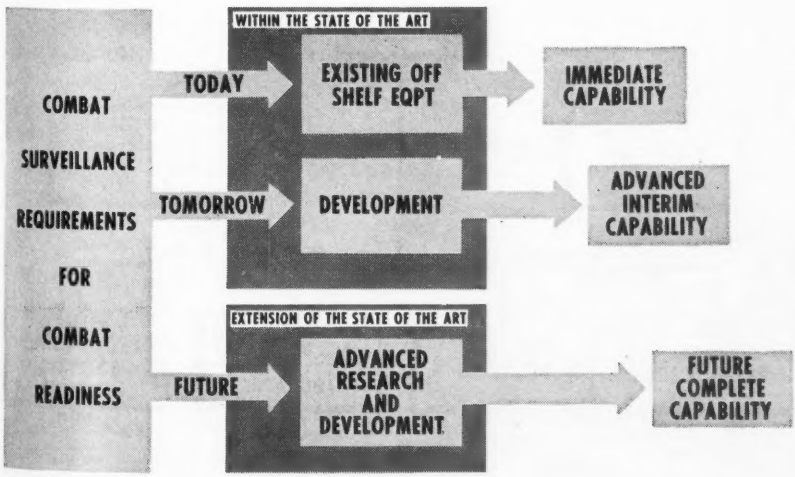
Mid-range time period. By 1962-1965 it is ACSA's second objective to develop an advanced interim capability in the combat surveillance area. This will involve use of the best techniques that the state-of-the-art allows. Attainment of this objective—now in process—will provide equipment that will take advantage of the experience gained in accomplishing the first objective.

Long-range time period. The third objective is to accentuate research and development within associated fields in order to advance the existing state-of-the-art and to exploit technical breakthroughs. Attainment of this objective will provide the Army with a greatly improved and highly effective combat surveillance and target acquisition capability.

In progressing toward these successive objectives ACSA is guided by the requirement to develop systems, not individual items or components of systems. In other words, our job is to develop combinations of equipment that will gain information, process it and transmit it to the point where it is delivered in usable form to the intelligence officer involved.

Principal Surveillance Areas

SPEAKING broadly, the principal ACSA developmental activities are grouped into two areas—ground and airborne surveillance systems. Both categories are concerned



with developments in the fields of radar, infrared detection, acoustic and seismic sensors, and photography. Techniques and equipment within these fields are under intensive study with a view to the production of equipment that will be simple, reliable, as inexpensive of maintenance and logistical requirements as possible, and sufficiently light to be transported by the echelon for which it is intended.

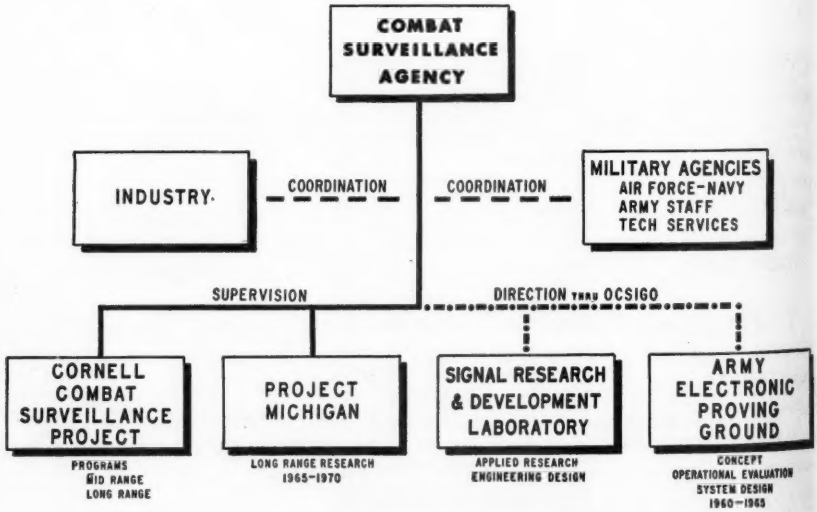
Much attention is being devoted to the development of airborne surveillance systems. ACSA planners do not envision a reduction in the tactical use of manned aircraft, but rather an expansion of the use of aircraft and its human observer, with the observer's capabilities supplemented by sensory equipment.

Advances in the field of antiaircraft weaponry make it clear that attrition of aircraft in future war will make the use of drones desirable. This has led to development of drones carrying appropriate sensory equipment that can penetrate enemy lines at very low altitude, survey enemy-held areas of interest and then return with the information or transmit it to the home base while still in flight. These drones, gifted as they are with a sense of "inherent courage," will be equipped with combinations of infra-red, radar, and photographic sensors. Selection of the sensor to be used will be based on prevailing weather and type of mission.

Ground surveillance equipment will include lightweight radar sets that are designed to detect intrusion, infrared viewers, and acoustic or seismic detectors that will provide information of enemy presence in distant areas.

Progress to Date

ALREADY the ACSA program has resulted in an initial payoff. Long-range ground radar sets have been furnished to overseas tactical Army units. These radars give division artillery commanders a capability of detecting enemy movement



Radar equipment, such as AN/TP-25 on location in Germany, combines with other items to furnish surveillance information to commanders in the field.

at night and during periods of reduced visibility. They enhance unit security in darkness, and facilitate bringing fire on points of enemy activity.

Army forces overseas have been provided with airborne radar surveillance systems capable of detecting vehicular movement in enemy rear areas despite overcast or darkness. Had this equipment been available during World War II, it could have detected the German build-up that preceded the Battle of the Bulge. Had it been available in Korea, it could have torn the cloak of darkness from Communist resupply activities.

A drone surveillance system, the AN/USD-1, is in the hands of our overseas units. This system, the forerunner of others to come, is presently designed only to provide photographic coverage of enemy-held areas that cannot be reached by manned aircraft.

Maintenance Support

UNDER sponsorship of the Deputy Chief of Staff for Logistics, New Equipment Introductory (NEI) teams have been organized, trained and sent to field commands where new equipment is being introduced. These teams, consisting of one or two officers and from two to six enlisted men, assist in the initial issuance, maintenance, and use of equipment. Manufacturers technical representatives also are made available, based on the needs of each command.

Stocks of maintenance supplies, even for the relatively small numbers of items in the program, have been procured, and special supply procedures for non-standard items have been evolved.

Training Problems

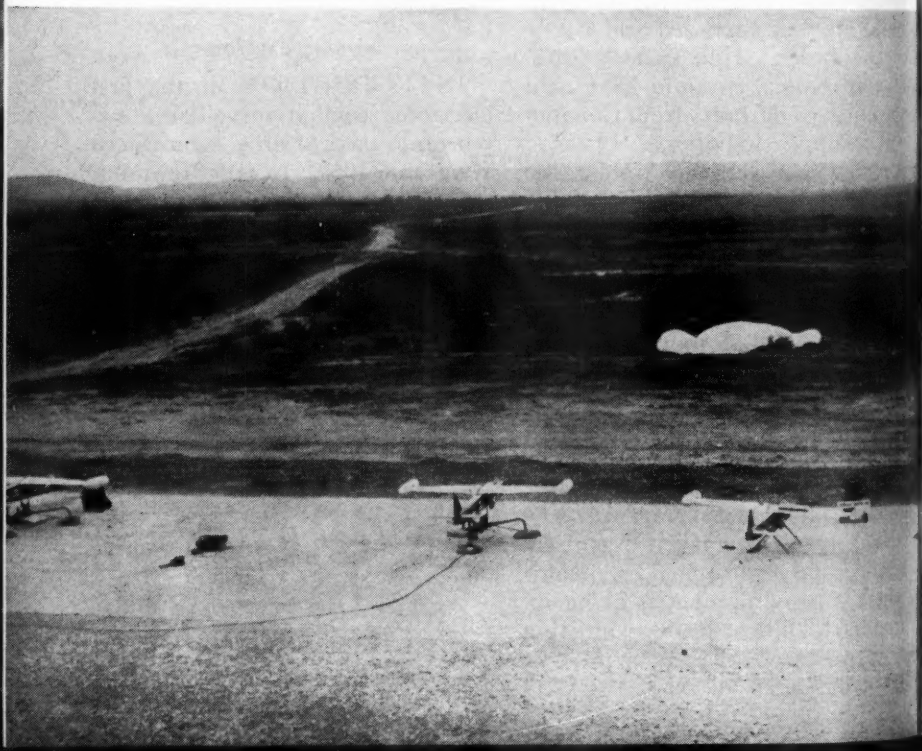
INTRODUCTION of the first electronic combat surveillance systems into tactical units commenced about mid-1959. In order to insure the arrival of trained personnel to operate and maintain that equipment, the Deputy Chief of Staff, Operations, formulated a detailed training plan. Headquarters, U.S.

Combat Surveillance Looks to the Future

Continental Army Command established the U. S. Army Combat Surveillance and Target Acquisition Training Command at Fort Huachuca, Arizona, to train surveillance specialists. The Training Command was provided with instructor personnel of exceedingly high caliber, and it was given top priority for all necessary instructional equipment.

Soldiers, selected with great care, were scheduled to complete training at Fort Huachuca at a time that would insure their arrival at the parent unit concurrent with delivery of the surveillance systems. This required a high degree of centralized control over the relatively few specialists involved but the system worked and the caliber of

Returning from an information gathering mission, a drone drifts earthward at Grafenwohr, Germany, to come to rest (right background) before group of others ready for flight.



Manned aircraft are widely used, as this L-19 plane equipped with KA-20 Camera set in pods under wings.

specialists so trained has been found to be high.

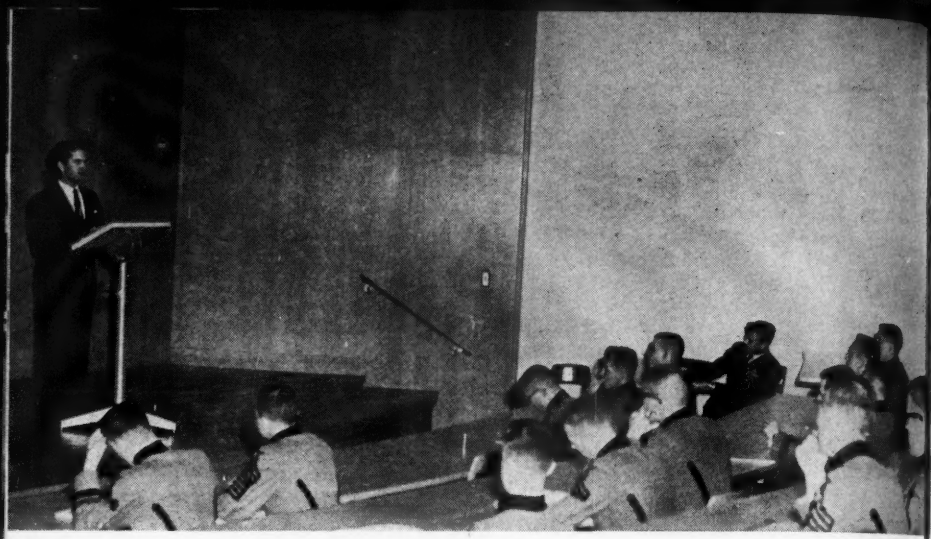
The Future

THE systems that have been furnished overseas units thus far are the beginning, not the ultimate. Although they provide a limited capability, they do not fulfill the Army's entire combat surveillance requirement. That they have shortcomings is recognized by the fact that their successor systems are presently under design. We can best learn by doing—and the use of the "first generation" combat surveillance equipment that has now been issued will enable ACSA to take advantage of ideas that are generated by those who use the equipment.

At present, good progress is being made in the development of a new low-endurance drone system, the AN/USD-2. A medium endurance and a long-endurance drone system —the AN/USD-4 and the AN/-USD-5 respectively — are progressing favorably. A successor to the side-looking airborne radar (SLAR) presently in use is now being designed as a component of the Mohawk surveillance system. These developments mark progress toward our second, mid-range objective.

The varied problems of the combat surveillance field challenge our Army, our research institutions, and American industry itself. Solutions must be found. It devolves upon ACSA to develop the capability that will permit our Army to take full advantage of the systems of weaponry that have been produced in the last two decades. ACSA's present developmental program is designed to accomplish this task.

Mohawk aircraft provides surveillance platform to be equipped with electronic sensors now under development.



For First Classmen at West Point—

NEW COURSE IN NATIONAL SECURITY PROBLEMS

THE United States Military Academy has this year added to its curriculum a special course in National Security Problems to be offered to selected First Classmen. Geared for advanced students of the senior class during their final semester of studies, the course resulted from a successful trial with sixty cadets in last year's class. It is part of West Point's continued efforts to produce the soldier-statesman combination.

Consisting of forty 80-minute periods during the final semester beginning in February, the program will give substance to the concepts of Service Academy higher education outlined by the late Secretary of Defense James Forrestal. In his directive to the Service Academy Board in 1949, prepared with the advice of (then) General Eisenhower, Secretary Forrestal emphasized the need for cadets to be aware of the major problems

Guest lecturer talks to composite class groups, then remains to meet fifteen-man seminar groups later.

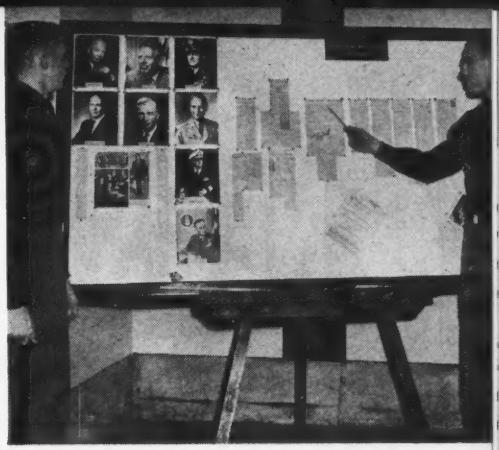
confronting the Nation. Service Academy students, he said, must understand the relationship between military preparedness and all other elements which "are also part of the fabric of real national security."

About one-tenth of West Point's 562 First Classmen will be selected from among those who volunteer for the program as a substitute for the regular International Relations course. About fifteen cadets will make up each group. Meeting in discussion seminars, they will be encouraged to read books and articles by authors of diverse views, and will prepare analytical writings on specific topics. They also will participate in discussions with faculty members and special guest lecturers.

Subject areas of the course include:

- The Setting, the Threat, and the Problem of Security;
- Problems in the Organization for Security Policy-Making and Control;
- Strategies and Defense Concepts;
- Regional Security and Alliances;
- Collective Security and the United Nations; and
- Cold War Measures.

Since the program will be carried out in the last semester at the Academy, the cadets will be able to apply prior courses in geography, history, government, economics and the sciences in analyzing pertinent security problems. By its very nature, the course cannot help but engender a keen interest in matters which will affect their future careers as Army officers.



Posted on bulletin board in seminar room are supplementary and current materials bearing on problems under study.

Cadets are counselled individually on preparation of papers, above. Informal seminar below, stimulates exchange of ideas.

NEWS of professional interest

BCT from Iceland

The Army Battalion Combat Team now in Iceland will be withdrawn under present Department of the Army plans following discussions with the government of Iceland. Withdrawal will not affect total strength of the Army since personnel will be absorbed into other units. The Department of Defense points out that the United States will continue to meet its commitments under the 1951 agreement with Iceland since Army units in Continental United States are available for quick return to Iceland in case of emergency.

All-Service Missile Training

With enrollment of the first Navy students, all three branches of the U. S. Armed Forces now are represented at the Army Ordnance Guided Missile School, Huntsville, Alabama. Four Navy guided missile technicians are the first to begin training on the supersonic Hawk missile. They have joined students from the Army, Air Force and 12 allied nations assigned to a variety of courses dealing with seven operational missile systems.

Infantry Refresher Course

A new extension course is being offered to infantry officers by the U. S. Army Infantry School, Fort Benning, Georgia, to enable inactive officers to keep up to date in latest doctrines and techniques. The refresher course covers organization, leadership, medical service, weapons, Trainfire I, logistics, signal communications, ground mobility, fire support, air-mobile operations, staff operations and general tactical considerations. It is organized into three sub-courses, providing a total of 47 credit hours for the inactive officer.

Cold Regions Research Facility

Construction is expected to begin this spring on a Cold Regions Research and Engineering Laboratory (CRREL) near the campus of Dartmouth College, Hanover, New Hampshire. The laboratory will combine two Army Engineer cold weather research facilities—namely, the Snow, Ice and Permafrost Research Establishment (SIPRE) now located at Wilmette, Illinois, and the Arctic Construction and Frost Effects Laboratory (ACFEL) at Waltham, Massachusetts. The CRREL program will be balanced between research on physical properties of snow, ice and permafrost, and the developmental aspects of engineering methods and techniques applicable to arctic area construction. Dartmouth College offered the Department of Army 15 acres on its campus without cost to establish the new facility. The new laboratory, costing some $3,250,000, will contain about 72,000 square feet of floor space and employ more than 100 persons.

Water-Repellent Clothing

A new experimental water-repellent for combat clothing, developed by the Quartermaster Corps, has successfully withstood a continuous one-inch-per-hour downpour for seven days. Called "Quarpel," the new finish is oil resistant and vapor permeable, can be laundered or dry cleaned and still retain its qualities. It is expected to have wide application commercially as well as for Army combat clothing use.

High-Altitude Test Chamber

A high-altitude test chamber that can simulate the virtually air-free environ-

ment at 10 miles above the earth has been placed in use at the U. S. Army Signal Research and Development Laboratory, Fort Monmouth, New Jersey. The chamber, which will aid in advancing the national space program, provides a new and highly accurate means to ensure that equipment and components have been engineered to retain operating stability. The stainless steel cylinder, eight feet long and five and a half feet in diameter, contains a highly efficient refrigeration system and infrared heat lamps that vary test chamber temperatures from 90 degrees below zero to 300 above Fahrenheit.

World War II History Series

Two books in the series "United States Army in World War II" have been published. *Logistical Support of the Armies, Volume II* by Dr. Roland G. Ruppenthal is the final Army historical volume on supply operations in Europe. *Military Relations Between the United States and Canada: 1939-1945,* 44th volume in the series, was written by Col. Stanley W. Cziuban. Both are on sale by Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Fog Machine for Pest Control

Designed to aid in control of mosquitoes and other flying insects, a high efficiency, large capacity "fogger" has been tested at the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir. Tests show that insecticidal fog practically rids an area of flying insects in 10 minutes. The machine uses DDT, lindane or malathion.

Rare Metal Under Study

Two low melting metals—one that will melt from heat of the hand—have been combined chemically by Army scientists to produce a rare metal that will withstand temperatures up to 1,500 degrees Fahrenheit. The new substance, called gallium phosphide, is expected to help solve the heat barrier problem encountered by electronic parts in nose cones of missiles fired into outer space. It also may be used in building solar-cell power plants for space stations, as well as electronic parts for missiles and satellites.

Resembling yellow ground glass, the material was "home-grown" at the U. S. Army Signal Research and Development Laboratory, Fort Monmouth, New Jersey. The new metal is composed of gallium, a rare silvery metal costing about $1,500 a pound in pure form which melts at very low temperature, and phosphorous which is used in matches and fireworks. The material still is under study to pinpoint its unique properties before release to

Sikorsky Photograph

SOMETHING NEW ON THE HORIZON. This crane helicopter, here carrying a weighted dummy of the Honest John missile, can transport a six-ton load. A literal "skyhook," it is designed to give the armed forces unusual mobility in transporting missiles and other heavy equipment. Known as the S-60, the flying crane is being developed by Sikorsky Aircraft, Stratford, Connecticut.

Signal Corps equipment development engineers. In recent studies, an electronic diode using the material withstood temperatures seven times higher than silicon and germanium, previously used in electronic diodes.

Engines Standardized

Marking a further advance in its engine standardization program, the Army now has begun supplying to troops the 1½ and 3 horsepower sizes of the newly developed family of industrial-type, small air-cooled gasoline engines. So far the Corps of Engineers has purchased some 20,000 of the two types from Continental Motors Corporation.

The Army's basic standardization program was launched five years ago to design and produce a new military family of air-cooled engines in ½, 1½, 3, 6, 10 and 20 horsepower sizes. These will eventually replace 78 different sizes and types. Because of interchangeable parts, only about 200 parts or assemblies will be required for stockage, compared to 23,000 parts necessary in World War II. The new engines also will have a service life of more than 1,500 hours without overhaul, compared to normal service life of up to 500 hours for existing types.

Courses for Exchange Employees

Intended to encourage career employees to improve themselves professionally, the Army and Air Force Exchange Service will share costs of approved courses of study taken by its Executive Management employees under a tuition assistance plan. The plan will be restricted to a career group of executive management program employees—now numbering some 850 persons at exchanges through the world. The tuition assistance plan is patterned after many existing educational plans in industry and closely follows provisions of Public Law 85-507, "The Government Employees Training Act."

Request the Digest . . .

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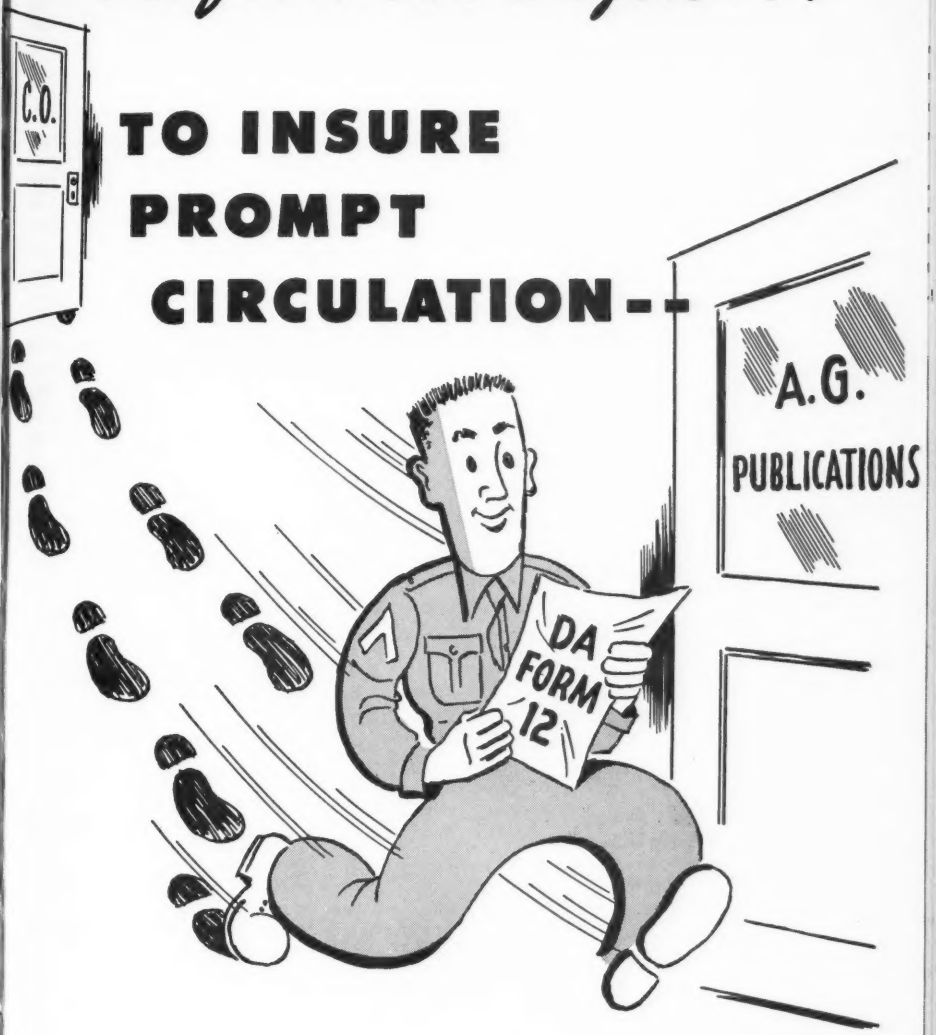

See Army Circular 310-72 (18 June 1959) which directs commanders to

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using DA Form 12-4 (Requisition for Initial Distribution of Publications and Blank Forms).

In this issue:

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